Source: Tim Koch, Ashokan Watershed Stream Management Program

ULSTER COUNTY

Road-Stream Crossing Management Plan

Ulster County Department of Environment

Contents

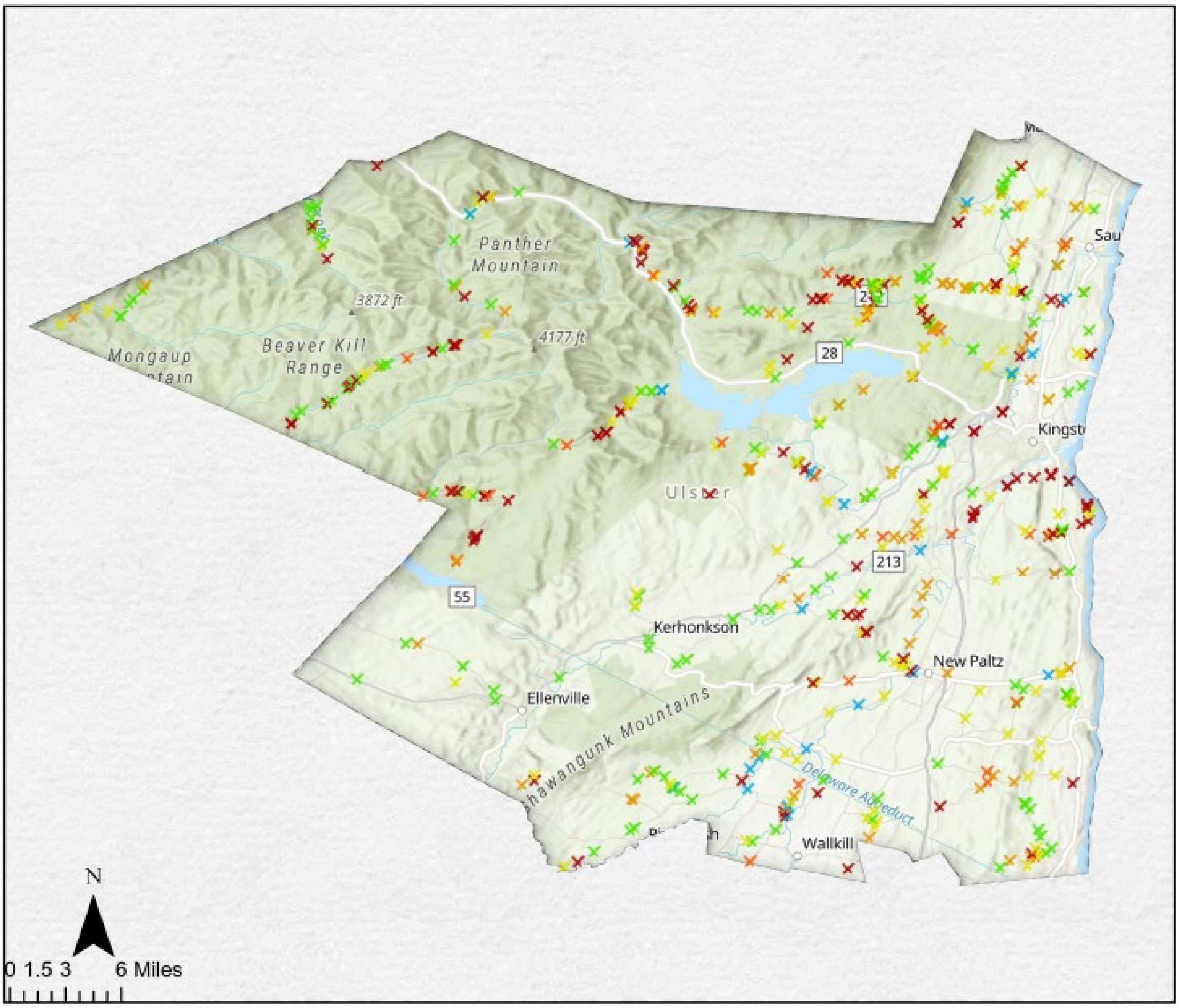
Section 1: Introduction

Source: Tim Koch, Ashokan Watershed Stream Management Program

1.1 Executive Summary

Streams and road systems are both linear networks, and where they intersect a bridge, culvert, or similar structure carries the road over the stream. These structures are commonly called road-stream crossings (Also referred to as RSX or simply as ‘crossing’ throughout this report). As a road is built to accommodate different levels of traffic, streams form to accommodate the watershed and climate of their environment. Streams and roads function differently but need to coexist with one another. RSXs that are not built to carry a stream without altering its natural shape are more vulnerable to flooding, require more maintenance, and can significantly disrupt aquatic ecosystems.

Because streams and transportation networks are linear systems laid over each other, intersections are common. Many of these RSXs are seasonal or year-round barriers to the movement of fish and wildlife. The results of broad ongoing research to identify flood risks and habitat barriers at RSXs indicate that a significant proportion of these structures are management issues.



Ulster County NAACC Assessed Road Stream Crossings

Road Stream Crossings on Ulster County Roads

NAACC Evaluation

- No barrier
- Insignificant barrier
- Minor barrier
- Moderate barrier
- Significant barrier
- Severe barrier

Map by Ulster County Department of the Environment 2021

*Data sources: North Atlantic Aquatic Connectivity Collaborative (2015-current) and Ulster County. for more information please see www.naacc.org
Methodology: Crossing sites selected within 25 feet of County Roads.

Source: Ulster County Department of Environment. Sourced from: www.naacc.org

1.2 Project Background, Purpose, and Steps

1.2.1 Background

Ulster County received funding through two grant programs to complete assessments of all County-owned RSX in Ulster County. From 2016 to 2018 a Hudson River Estuary Program grant supported the assessment of all RSX outside of the NYC Watershed using the NAACC protocol. In 2019 and 2020, a NEIWPCC and Hudson River Estuary Program funded project supported an expanded multi-objective assessment of RSX in the Lower Esopus Watershed, which was completed in partnership with Cornell Cooperative Extension of Ulster County. This expanded protocol is called the Multi-Objective Stream Crossing Assessment Protocol (MOSCAP). In total, Ulster County has performed well over 500 NAACC assessments, and nearly 300 road stream crossings received a MOSCAP assessment (County and Town owned crossings). Ulster County also periodically performs a DOT culvert analysis of all large County owned culverts (over five feet width). These data are stored with the County's Department of Public Works.

Additionally, a dam inventory and map of all dams in Ulster County is included in this Plan. The County's dam inventory was compiled using data from the New York State DEC Inventory of Dams. There are 187 dams in Ulster County that are included in the inventory, as well as many more dams that are unregistered. As all dams are potential barriers to aquatic connectivity, and can pose threats to human safety and infrastructure, it is important to know the location and status of these dams. A map of the dams included in the NYS Inventory of Dams, as well as the table with more information regarding specific dams, is included in Appendices J and K.

The County-wide RSX assessments and the dam inventory are linked to the following initiatives: a County-wide climate resilience planning process funded by the New York State Department of the Environment (DEC) Office of Climate Change, Lower Esopus stream management planning efforts, the Ulster County Multi-Jurisdictional Hazard Mitigation Plan, the New York State Climate Smart Communities Program, the Ulster County capital planning process, and the UC Transportation Council Transportation Improvement Program (TIP).

1.2.2 Purpose

During storm events, RSX may fail catastrophically when floodwaters exceed the hydraulic capacity of a culvert and/or sediment and debris plug the culvert. The subsequent damage to road infrastructure and adjacent property can deliver large pulses of sediment to stream channels (Furniss et al. 1997).

Additionally, RSXs can significantly fragment aquatic ecosystems, often resulting in substantial negative consequences. These improper crossings disrupt the movement of aquatic organisms, sediment transport, nutrient transport, and other critical ecological processes (NAACC, 2019).

Section 2: Road-Stream Crossings

Source: Tim Koch, Ashokan Watershed Stream Management Program

2.1 Watersheds

A watershed is an area of land which water drains into a body of water. Strictly speaking, watersheds are a physical boundary based on topography, hydrology, and gravity (Cech, 2010). Topographical high points are the defining margins of a watershed, as they determine the direction water will drain. The size of both the watershed and body of water can vary. The body of water could be as small as a pond with backyard hills acting as a watershed, or as large as multiple mountains supplying water to a reservoir. Watersheds are also nested by nature. As shown in the figure to the right, a small watershed is completely contained by a medium watershed, and the medium watershed contained within a large watershed.

Watersheds as Nesting Units. A large watershed is made up of many smaller watersheds. Source: Amanda LaValle, Ulster County Department of Environment.

A watershed can greatly influence the quantity and quality of the water that travels through its boundaries. Various aspects of a watershed all contribute water characteristics in their own way. These aspects include the watershed's geology, soils, slope of the land, land use, vegetative cover, and the climate (Cech 2010). They work and interact with one another in a way that ultimately creates changes in water quantity and quality. The turbidity in the Upper Esopus Watershed is an example of how the geology of a watershed can affect its water. The Catskill region is a glacially affected area and as a result, clay lenses are present in the landscape. As the water drains down the mountain sides within watershed boundaries, it carves into the land and reaches these clay deposits. The clay is then carried through the water and into the Ashokan Reservoir- effectively making the water turbid.

Another aspect that affects the water quantity and quality is the climate. With climate change, the Hudson Valley will be subjected to increased rainfall; both in occurrence and duration. Increased rainfall events can cause a stream to reshape itself to accommodate the larger amounts of runoff. Erosion results during reshaping processes and therefore enhances the ability of the stream to access clay deposits (Cech 2010).

A new hydrologic regime will also have an impact on human built infrastructure. RSXs may not be able to handle the larger runoff events; mostly due to the structure being undersized. This leads to a greater risk of flood and damage to local communities. In order to increase resilience, RSXs should be built with the current hydrologic regime in mind. These are all examples of the multitude of feedback relationships and the interconnectedness of watersheds (Cech 2010).

The watersheds are a way of connecting our water resources and waterways with people, landscapes, and land use. The watershed concept is the physical idea of a watershed and the ecological and social organizing model of a watershed. It has been used as an increasingly popular way to make natural and human systems to be more interconnected and interdependent (Cohen & Davidson, 2011). The science and concepts related to watersheds are important to humans because they are directly connected to both water quantity and quality. Abundant clean water supplies are essential to human activity- they are necessary for safe drinking water, sanitation, irrigation, and industry. Humans, through varying land use and water use practices, can affect water quantity and water quality.

2.2 Streams

Streams are dynamic systems that do complicated work. The work of streams is the collection and movement of water, sediment, and debris from the surrounding landscape. The shape of streams change with time as erosion, deposition, and transportation of sediment occurs. The information used in section 2.2 Streams was sourced through Housatonic Valley Association (HVA) and Lower Hudson Coalition of Conversation Districts (LHCCD). See appendix I for more details.

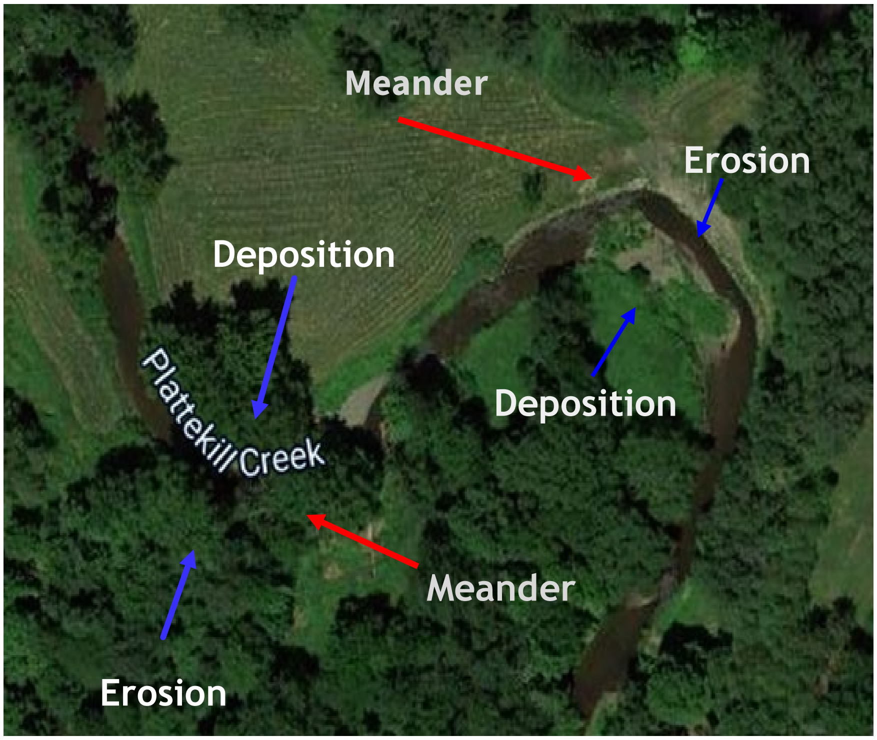
2.2.1 The Structure of Streams

Streambed and Channel

The streambed is the foundation of a stream and supports its banks. Streambeds are composed of a variety of materials. The size ranges from large materials like bedrock, large boulders, and rocks, to smaller materials like gravel, sand, silt, and clay. The scouring and depositing of these materials shape the stream channel and its floodplain. The structure of a channel is described by the following: length of meandering or curving (pattern), width and depth of the channel (dimension), and the degree of slope (profile).

Meanders

The processes of erosion and deposition serve to lengthen a channel through a curving process known as “meandering”. Meanders are essentially curves. While water flows around a curve, the outer edge of the water is flowing faster than the inner edge. The increased velocity of the water causes bank erosion on the outer section of the curve (cutbank) and removes material. The decreased velocity of the water on the inner part of the curve encourages sediment to drop out of the slower moving water resulting in the deposition of material, usually of the smaller sort(i.e. sand and gravel) along this bank (point bar). Curves slow down the water and absorb energy, which helps reduce the potential for erosion.



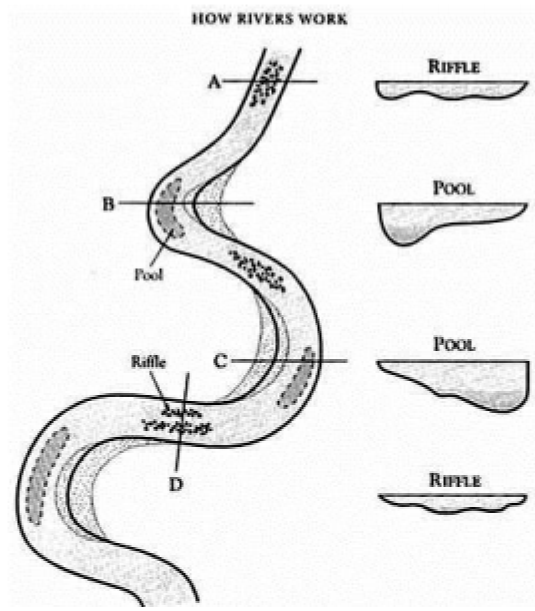
A bird's eye view of two meanders within the Plattekill Creek. Deposition will occur on the inner part of the curve while erosion will occur on the outer part of the curve. Source: Ulster County Department of Environment.

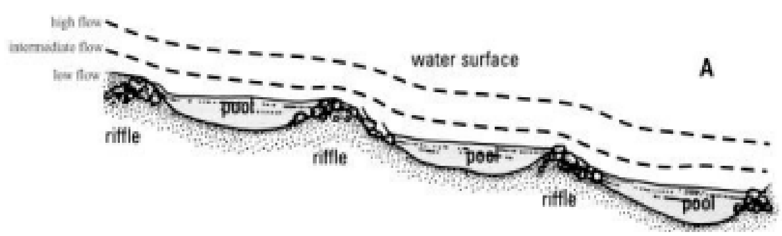
Slope

Slope is the change in elevation or steepness of a streambed. Streams with higher slopes have higher gradients, straighter channels, and a more rapid movement of water, streams with lower slopes have lower gradients, more meanders, and more slow-moving water.

Pools, Steps, and Riffles

Streams alternate between concentrated (convergent) flows and flows which are more spread out (divergent). Convergent flows are deeper, faster and more erosive. Pools are deeper areas that were scoured out during high flow events. As water flows over the pool, the velocity of the flow decreases and sediment is dropped towards the end of the pool. This creates a riffle. This alteration between bed erosion and deposition creates “bed forms”. These bedforms help manage the energy held by a stream. Streams are often classified by these bedforms (i.e. pool-riffle or pool-step streams).





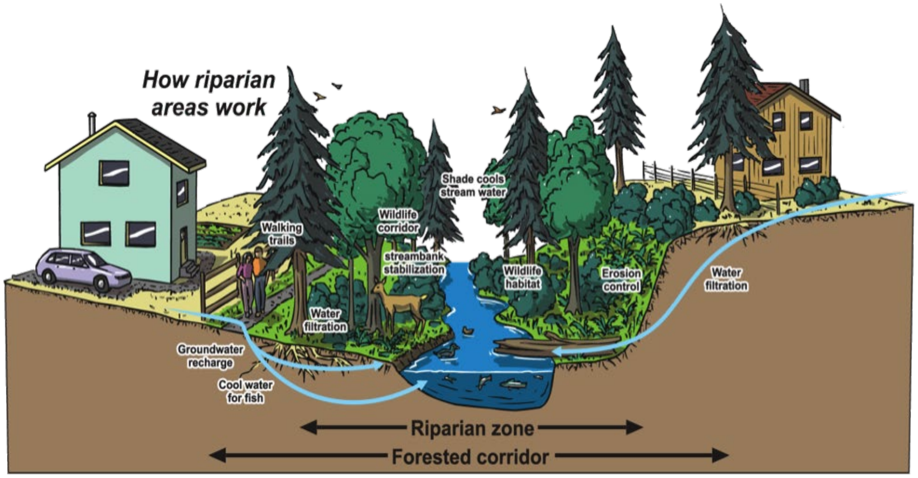
River pattern, dimension, and form. Source: Housatonic Valley Association (HVA) and Lower Hudson Coalition of Conversation Districts (LHCCD). See appendix F for more details.

Stream Reach

A stream reach is a segment of a stream with similar physical characteristics throughout its length.

Riparian Area/Riparian Buffer/ Riparian Zone

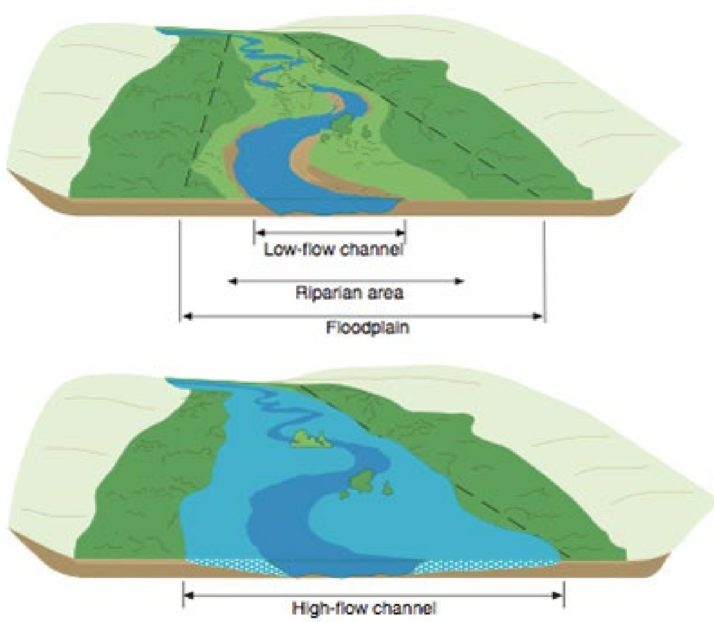
The riparian area is the interface between land and a stream. This transition area acts like a buffer and includes vegetation, wildlife, and other natural features. It can benefit streams in several ways: the roots of vegetation stabilize streambanks, vegetation filters sediment and excess nutrients, and the tree canopy provides shade to cool water temperatures. Riparian zones can also help dissipate a stream's energy.



A riparian zone. Source: Regional District of Nanaimo.

Floodplain

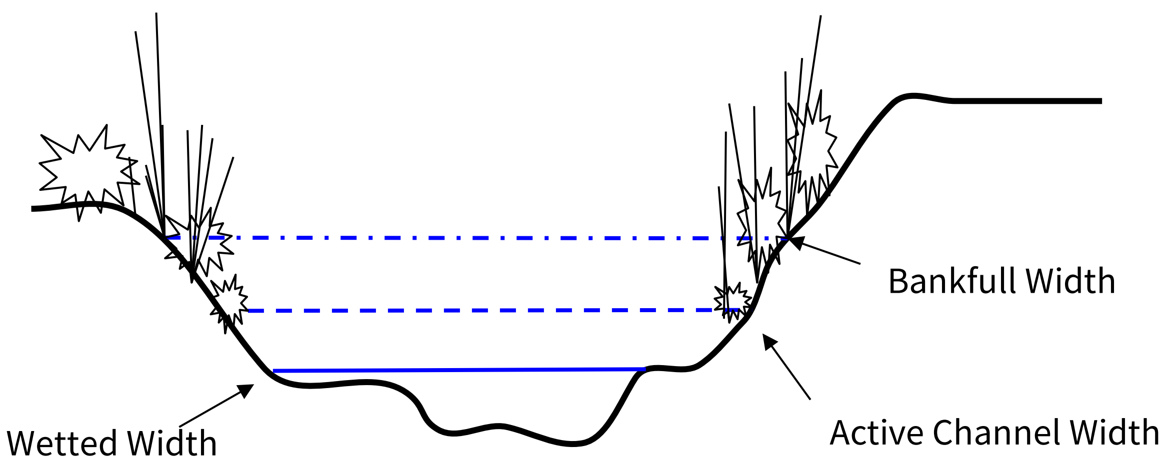
A floodplain consists of the flat areas of land adjacent to the stream. These areas consist of stream sediment and are separated from the channel by a stream bank. Floodplains are prone to flooding. Floodplains provide a place for water to go when it cannot be contained in the channel, such as during spring thaw or heavy precipitation events, and they are subject to flooding.



The floodplain of a stream. Source: Ashokan Watershed Stream Management Program.

Stream Corridor
Stream corridors consist of the channel, floodplains, and adjacent lands. Streams should be able to meander freely, allowing for sediment and the energy of flowing water to be distributed more evenly. These are complex ecosystems that provide an avenue for wildlife movement and other important natural processes.

Active Channel Width
Active channel width is a measurement that can be examined when comparing the stream dimensions to the structure dimensions. Active channel width is defined as the width of the stream channel that is most frequently affected by higher flows. It is greater than the wetted width of the channel but smaller than the bankfull width. Indicators of active channel width may be a break in slope of the stream banks, sudden sediment size change in the stream banks, a wrack line, or change in vegetation from herbaceous to woody. There are several other indicators of active channel width.



Active channel width is larger than wetted width and smaller than bankfull width. Source: Ulster County Department of Environment.

2.2.2 How Streams Work

The process of moving water and sediment downhill contains a large amount of energy. The stream dissipates such energy through the formation of channels. Structures like floodplains, meanders, and bed forms within channels help uniformly spread a stream's energy and sediment load. Streams are in a state of dynamic equilibrium- constantly adjusting to keep their energy in a state of balance. Multiple factors describe this process and are defined in the section below.

Kinetic Energy/Friction/Base Flow/ Storm Flow

Kinetic energy is the energy of movement. As water flows downward, the energy is converted from potential energy to kinetic energy.

Friction

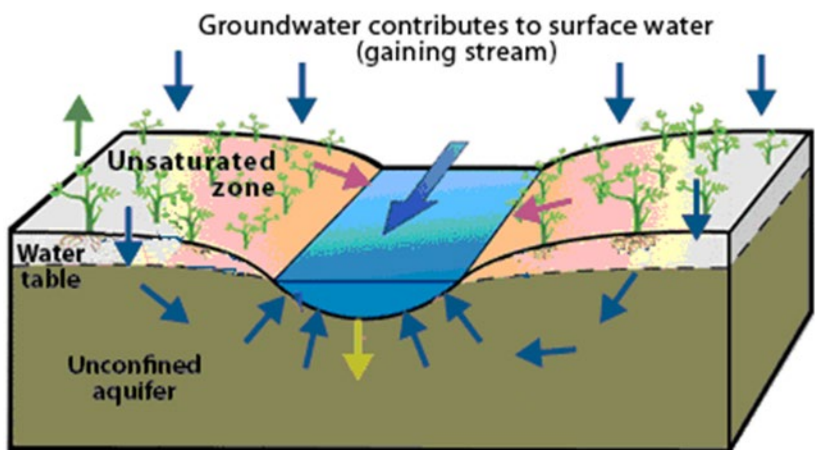
Friction is a way streams can dissipate their energy. The roughness of a stream bed, banks, and floodplain creates friction, and through that, a large amount of energy is lost. This roughness includes things like rocks, wood, and vegetation in the channel or floodplain.

Stream Flow

Stream flow is the amount of water carried by a stream. The amount can vary and is influenced by several factors, like the time of year (ephemeral streams) and amount of precipitation. Precipitation mainly reaches streams in two different ways: base flow or storm flow.

Base Flow

Base flow is water that infiltrates the ground and contributes to groundwater flow. The source of water is rainwater and snowmelt. After it infiltrates the ground, it slowly moves through the bedrock and soil to contribute to base flow. This provides a steady supply of water to many streams and rivers.

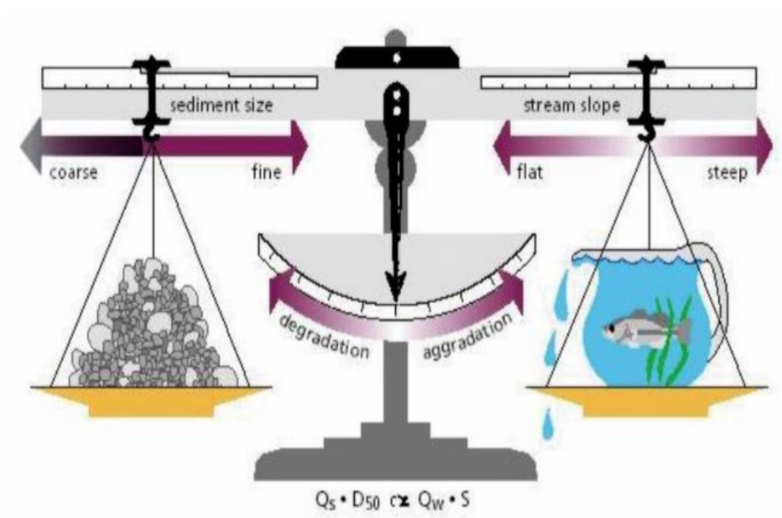


Source: USGS

Storm Flow
Rainfall and snowmelt that flows through a watershed using the land surface or near-surface soil. This is the main component of high stream flows during rainy weather and spring snowmelt and is dependent on precipitation patterns and watershed characteristics.

Sediment Transport
Stream energy that is not used by kinetic motion and friction is available for transporting sediment. The sediment is supplied from the surrounding landscape and the erosion of the bed and banks.

Dynamic Equilibrium
Streams exhibit a dynamic form of stability. They are in a state of balance between continuing processes. Streams are moving and changing, but generally in a slow and predictable manner. They can maintain their dimensions, pattern, and profile without dramatic changes in the pattern of its erosion and deposition processes. When a natural stream develops an equilibrium depth and slope, the shape of its channel is determined by the coarseness of the sediment in its bed, the soil cohesiveness and soil binding properties of vegetative root systems on its banks.



The above figure depicts Lane's balance, which describes how changes in sediment load, sediment size, slope, and discharge determine whether a stream system will aggrade or incise. Source: (HVA and LHCCD. See Appendix F for more details.

How Channels Change Their Shape

Streams in dynamic equilibrium are considered to be stable. They experience small-scale adjustments but are generally consistent in respect to their channel dimensions, pattern, and profile. Stable streams erode their banks and migrate over time across their floodplains. Consequential changes in channel shape are due to large-scale events, like major floods and human intervention into the stream corridor.

Reference Condition

- **In Adjustment:** The term “in adjustment” refers to a stream reach where the channel structures and stream processes have deviated from the expected natural conditions. These unstable stream segments haven’t evolved into a completely new stream type.

- **Poor condition:** The term “poor condition” refers to a stream that is in “disequilibrium” and is departing from its stream type. The stream reach is exhibiting a new stream type and would need to go through extreme adjustments until it evolves back to the reference reach.

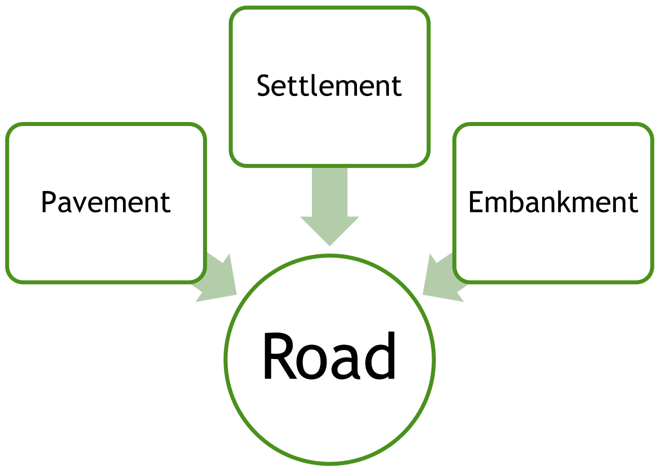
Because streams compose one-half of a RSX, it is imperative to understand how they work to manage RSXs correctly. Streams are dynamic, complex systems that go through a multitude of processes involving the transportation of sediment and water. They change and maintain their shape through erosion and deposition; and having a RSX to accommodate an entire stream without affecting these processes is essential.

2.3 Indicators: Need for RSX Replacement

When a RSX is not adequate, external indicators appear. There are several indicators that show up in a RSX that may need to be replaced. They can appear in several different locations: either the road, actual structure of the crossing, or the stream. Indicators in the road and crossing structure are oftentimes of deterioration. Indicators seen in streams are erosion and deposition, which is a sign the stream is out of equilibrium. Indicators RSXs need to be replaced are discussed below, in terms of road, crossing structure, and stream.

2.3.1 Road

Deteriorating roads are oftentimes a sign that the RSX is inadequate. The three components that help determine the overall condition of the road are the pavement condition, settlement condition, and the embankment condition.



Pavement

According to NYSDOT (2006), each pavement type will show signs of deterioration in different ways and are as follows:

An example of road. Source: Ulster County Department of Environment.

- Asphalt pavement: Rutting, potholes, and general disintegration.
- Concrete pavement: Craving, delamination, and spalling.
- Gravel surfaces: Rutting, potholes, and loss of the center crown of the road.
- Wood bridge decks: Rot, splintering, warping, and material loss will occur in the deterioration process.

The riding quality will also decline in roads that are inadequate. Roads may be rough and have grooves in the wheel path that may trap water and lead to hydroplaning (NYSDOT, 2006).

Settlement

Settlement refers to the degree of differential settling of the road surface relative to the crossing structure. It is intended to rate the smoothness of the transition from the approach roadway to the crossing structure. According to NYSDOT (2006), evidence of differential settling is as follows:

- A noticeable dip or bump in the road that is felt when driving across the RSX.
- Cracking and breaking of the pavement.

An example of settlement on Lucas Ave. Source: Ulster County Department of Environment.

A straightedge laid across the structure longitudinally over the pavement approach is useful for observing settlement (NYSDOT, 2006).

Embankment

The roadway embankment is the slope that rises from the stream to the road surface. The stability of the embankment is the main consideration. According to NYSDOT (2006), indicators of poor embankment are:

- Settlement and/or sloughing of side slopes. This can result in a convex appearance of the side slope or abrupt changes in the side slope suggesting failures.

- Soil cracks perpendicular to the slope or abrupt changes in the side slope.
- Guide rail posts out of plumb and leaning outward and down the slope.
- Vertical displacement of guide rail and posts.

Pavement, settlement, and embankment condition all influence the overall road condition.

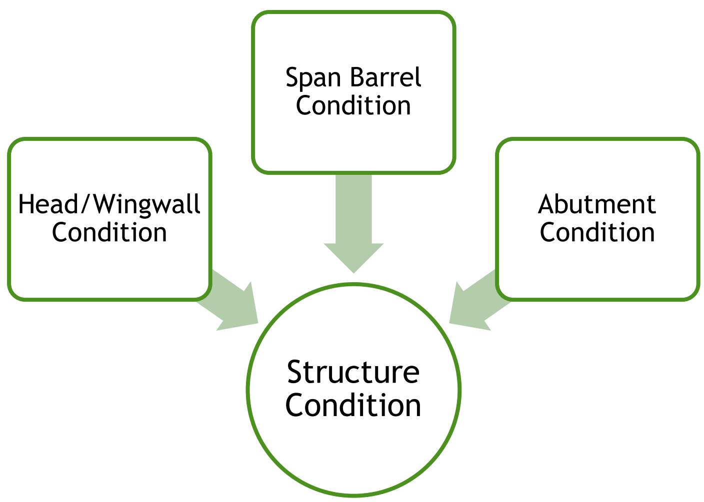
An example of a deteriorating embankment on Kripple Bush Davis Corners Road. Source: Ulster County Department of Environment.

2.3.2 Structure

As RSXs age, signs of aging and deterioration will be apparent in the structure. The crossing structure can include any of the following and may differ from crossing to crossing: span barrel, abutment, headwall, and/or wingwall. The following section discusses indications of a weakening structure in RSXs.

Span Barrel Condition

The span barrel is the inside of the structure where water flows from the upstream inlet to the downstream outlet. The assessed components will differ based on the type of RSX being observed.



For plastic, metal, or concrete pipes (round, elliptical, arch), observable deterioration is on the inside of the pipe. According to NYSDOT (2006), they include:

- Irregularities or deformities in the shape
- Section loss, corrosion, and abrasion

- Failing span barrels would have significant to extreme distortion, severe isolated corrosion or pitting, widespread moderate section loss, significant cracking along seams, and soil infiltration into structure

An example of a span barrel on Atwood Road.
Source: Ulster County Department of Environment.

For box culverts and open bottomed arches, the deterioration would occur on the ceiling slab. According to NYSDOT (2006), defects are:

- Cracks, spalls, and delamination of material
- Vertical/horizontal misalignment
- Differential movement or settlement at joints between sections
- In severe cases, extreme deterioration, differential movement or settlement of span barrel.

For all bridges, the primary members, slabs, and the structural deck will have observable deterioration. According to NYSDOT (2006), indications of deterioration include:

- Corrosion, cracks, delamination, distortion, and section loss of any steel girders
- Cracking, efflorescence, spalling, and exposed rebar in any slabs
- Deck leakage
- A failing span barrel on a bridge would have severe section loss on steel girders or severe impact damage to structural members, heavy spalling or efflorescence on deck, and/or structural components rendered ineffective by deterioration or impact damage.

Abutment Condition

Bridges and box culverts will have abutments. According to NYSDOT (2006), general signs of deterioration are:

- Vertical and/or horizontal misalignment
- Differential movement or settlement at joints between sections
- Joint separation
- Leakage
- Cracks, spalls, and delamination
- In severe cases, abutments would have deterioration, differential movement or settlement so severe failure has occurred or is imminent.

An example of abutments. Source: Ulster County Department of Environment.

Headwalls and/or Wingwalls Condition

If applicable, it's important that the headwall and wingwalls have the ability to retain the embankment material and support the guardrail. According to NYSDOT (2006), deterioration of structure includes:

- Movement of the headwall/wingwall from its original location, along with associated effects on the embankment and/or guide rail can happen.
- Cracks, spalls, and delamination
- A failing headwall or wingwall would be severely deteriorated and movement is so severe that either the headwall or wingwall no longer supports the embankment or guide rail.

An example of headwalls and wingwalls on Hurley Mountain Road.
Source: Ulster County Department of Environment.

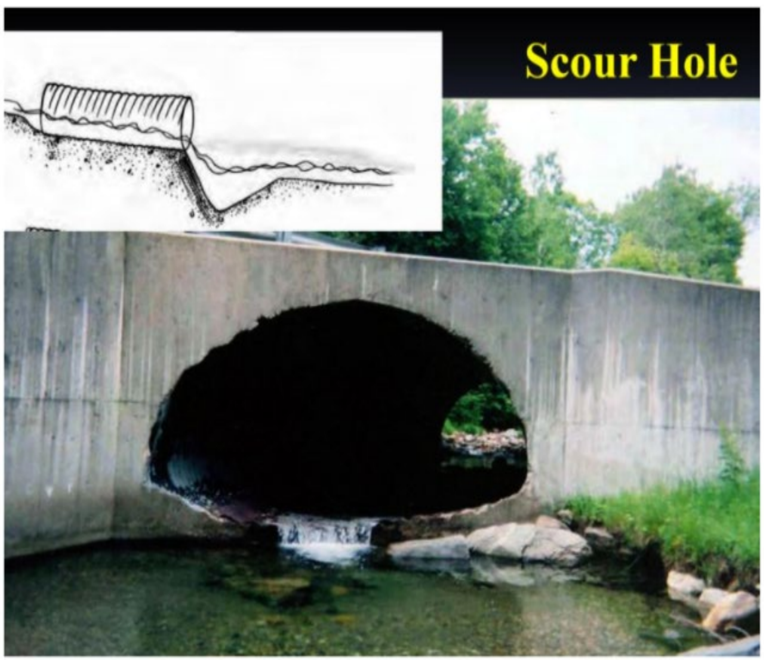
Maintaining the structural condition of a RSX is imperative to creating resilient and functioning infrastructure within a community. While the structural components that make up RSXs can differ, the weakening of them will cause the same outcome: a failing RSX. Failure of a RSX can be catastrophic and endanger a local community by leading to a higher flood risk, closure of roads, as well as blocking passage of aquatic organisms. Therefore, it is crucial to look for signs of deterioration in any of the structural components within a RSX.

2.4 Indicators: RSX and Stream Incompatibility

For a RSX to be compatible with the stream, it needs to pass the stream without interfering with any natural process. RSXs that are not compatible with the stream will generally display common indicators. The information used in section 2.4 Indicators: RSX and Stream Incompatibility was sourced through Housatonic Valley Association (HVA) and Lower Hudson Coalition of Conversation Districts (LHCCD). See appendix F for more details.

2.4.1 Degradation, Incising, Scouring Down

These situations are a result of a stream having excess energy. The stream has more than enough energy needed to transport sediment and begins to erode into its bed or banks. Degradation is most visible in actively eroding banks or headcuts and is common at the downstream end of undersized culverts. A headcut is a small waterfall, often resulting from the deepening of a channel caused by dredging, excavation, or increased stream erosive power downstream of a natural or human caused constriction.

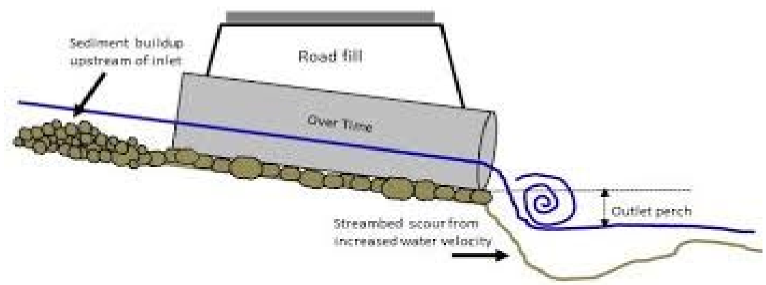


Scour hole downstream of an undersized culvert. Photo source: UMASS River and Stream Continuity Program.

Sometimes degradation is confined to one spot right below an undersized culvert as the culvert serves as grade control. This is called a “scour hole” and it can turn into a very wide, deep hole that undermines adjacent stream banks. These “perched” culverts then block the movement of fish and wildlife upstream. In situations where a head cut is uncontrolled, the headcut and associated erosion will migrate upstream until it is stabilized.

2.4.2 Aggradation and Lateral Adjustments

When a stream does not have enough energy to transport its sediment load, it will deposit sediment in its channel through a process called "aggrading". As the streambed rises, the water spreads out, eroding laterally (lateral width adjustments), and thus widening the channel. When moderate to extensive vertical adjustments of the stream channel have been set in motion, a stream is in disequilibrium and the channel has the capacity to evolve. RSXs that constrict the natural channel can have multiple effects on the stream channel; one of them being aggradation, which commonly occurs upstream of the crossing. The hydraulic capacity is reduced from the constriction as sediment and debris block the inlet of the crossing. As well as aggradation, erosion of adjacent stream banks is common. The rate of change in a stream channel relies on several factors: the erodibility of the bed and bank materials, the supply of sediment, and the frequency of flooding. For example, a stream bed with non-cohesive banks (i.e. gravel) in a watershed that has flash floods often will evolve in a smaller amount of time compared to a streambed that has more cohesive banks (i.e. clay) where flooding has not occurred very often.



Deposition and scouring occurring in an undersized culvert.
Graphic source: UNH Extension.

While in the field monitoring RSXs, it is important to look for each of these features: degradation, incising, scouring down, aggradation, or lateral adjustments. Each feature may look different, but all result from the same problem: the RSX is not compatible with the stream. A RSX should be able to pass a stream without interfering with a streams natural process. If a RSX is compatible with the stream, it will not display any of the indicators discussed above.

2.5 RSXs and Common Impacts to Streams

Road-stream crossings can be extremely disruptive to stream equilibrium and aquatic organisms if not designed to pass the natural stream channel without interrupting the natural process. As well as harming ecological integrity, RSXs that do not mimic the natural stream channel can pose risks for human safety by being a flood risk. The information used in section 2.5 RSXs and Common Impacts to Streams was sourced through Housatonic Valley Association (HVA) and Lower Hudson Coalition of Conversation Districts (LHCCD). See appendix F for more details. Below are some common impacts associated with RSXs and how they relate to stream structure and function:

An example of an undersized crossing on Sawkill Road. Source: Ulster County Department of Environment.

Undersized Crossings
A crossing that constricts the natural stream channel is considered undersized. The active channel width of the stream is larger than the width of the culvert and acts a funnel, creating faster flows. The increased velocity causes erosion at both the inlet and outlet. Undersized crossings are often accompanied by outlet drops and/or scour pools.

An example of a culvert with an outlet drop on Atwood Road. Source: Ulster County Department of Environment.

Outlet Drops/Perched Culverts
Outlet Drops or perched culverts occur when crossings are incorrectly installed/designed and have large drops at the outlet. This situation can also be caused by erosion/scouring of the downstream stream bed.

An example of a shallow crossing Source: Ulster County Department of Environment.

Shallow Crossings

Shallow crossings can create multiple risks for both flooding and aquatic life. They are usually either undersized or improperly aligned. This leads to high flows and erosion that causes low levels of flow inside the culverts. Shallow depths can become a barrier to fish passage and even become impassable or dry for extensive periods of time. They also may not have a substrate that matches the stream bed.

An example of a clogged crossing. Source: Ulster County Department of Environment.

Clogged Crossings

Clogged crossings create barriers to fish that make the crossing impassable. Specifically, clogged inlets can make it easier for upstream ponding and flooding to occur. If not removed, the backup of debris may also create an inlet drop. Crossings that are undersized or are known to have beaver activity are more at risk to become clogged.

An example of ponding. Source: Ulster County Department of Environment.

Ponding

Ponding is the backup of water upstream of a crossing. Typically, this happens because a crossing is undersized and can continue throughout the year due to an issue like clogging or may occur seasonally due to an issue like highwaters/flooding. Ponding can create multiple problems. It may drive stream bank and road erosion and creation of wetland ecosystems. Ponding can also be harmful to aquatic life by creating stagnant water, which leads to increased temperatures and lower oxygen levels.

An example of a misaligned crossing on Atwood Road. Source: Ulster County Department of Environment.

Misaligned Crossings

Misaligned crossings are crossings that improperly installed in a way that causes the inlet to be skewed in relation to the stream. Crossings should be installed at the same angle as the stream. Crossings that are not have an increased chance of clogging, scouring or eroding, and ponding.

An example of erosion caused by a crossing on Atwood Road. Source: Ulster County Department of Environment.

Scour and Erosion

Scour and erosion are consequences of all crossing insufficiencies besides shallow crossings. It is a direct consequence of high flow and ponding. Erosion of stream banks will occur both upstream and downstream of the crossing. Scour pools will occur at the downstream of perched crossings. This can lead to the undercutting of the crossing and possibly the road. Aquatic organisms are also affected as the natural substrate is eroded. This deteriorates passage and natural habitat.

An example of a crossing that lacks natural substrate on Atwood Road. Source: Ulster County Department of Environment.

Lack of Substrate

Incorporation of natural substrate in a crossing that matches the stream is critical for aquatic organisms. By using the rocks as an anchor or a mechanism for movement by taking advantage of slower water around rocks and other substrate, aquatic organisms can safely maneuver through their environment. It recommended that this idea is implemented within a crossing to maintain natural conditions. Once natural conditions are maintained, stream continuity remains uninterrupted and scour is avoided. It’s recommended that metal, or smooth and unnatural materials, be avoided when constructing a culvert as these materials tend to increase water velocity.

Aging Infrastructure

It is recommended to replace crossings that are antiquated in terms of current crossing standards. Older crossings may have extensive scour and erosion. They may be failing or close to failing due to movement and/or breakage of individual components. These inefficiencies can pose a flood risk. Keeping maintenance records updated allows for tracking and planning for proper maintenance over time, which can serve to protect a crossing against deterioration and prolong its life.

An example of a crossing that is aging on Atwood Road.
Source: Ulster County Department of Environment.

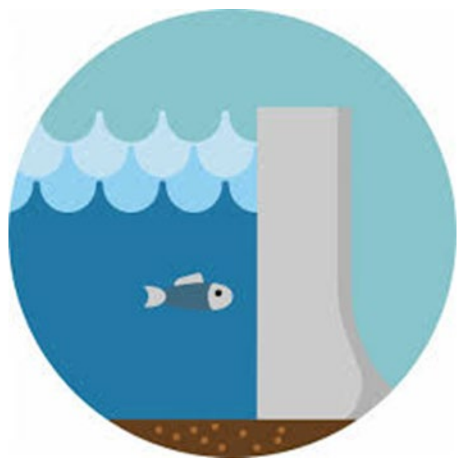
The scenarios discussed above are all examples of common impacts to streams. If not designed and installed correctly, RSXs can be very disruptive to aquatic organisms and the stream itself. These examples should be avoided if possible.

2.6 Dams

Dams are large barriers that stop or restrict the flow of water. They can be man-made or exist from nature (i.e. landslides or glacial deposition). Many dams are man-made structures and thousands of dams are in place across the United States. While dams can be useful to the public in many ways by suppressing floods and providing water; they can also pose a risk to the public if the structure fails, and they can be a threat to ecological integrity. Existing dams are getting older and new dams are being built in hazardous areas (NYSEDC 1987). An inventory of dams located in Ulster County can be found in Appendices J and K. There are 187 inventoried dams in Ulster County. The following sections below discuss the ways in which dams impact streams and aquatic organisms, as well as the potential circumstances that produce dam failure and how owners can protect against failures by doing proper maintenance:

2.6.1 Impacts to Streams and Aquatic Organisms

Dams change the way rivers and streams function, as well as having an effect on aquatic organisms. They can trap sediment, which bury rock riverbeds where fish spawn. Gravel, logs, and other important food and habitat features can also become trapped behind dams. This negatively affects the creation and maintenance of more complex natural habitats (e.g. riffles, pools) downstream.



Graphic Source: Iconfinder.com

Dams that divert water for power and other uses also remove water needed for healthy in-stream ecosystems. Peaking power operations can cause dramatic changes in reservoir water levels, leaving stretches below dams completely de-watered. This also can prevent fish migration by limiting their ability to access spawning habitat, seek out food resources, and escape predation. By altering the timing of flows by withholding and then releasing water to generate power for peak demand periods, natural seasonal flow variations are disrupted. Natural growth and reproduction cycles that occur in many species are destroyed.

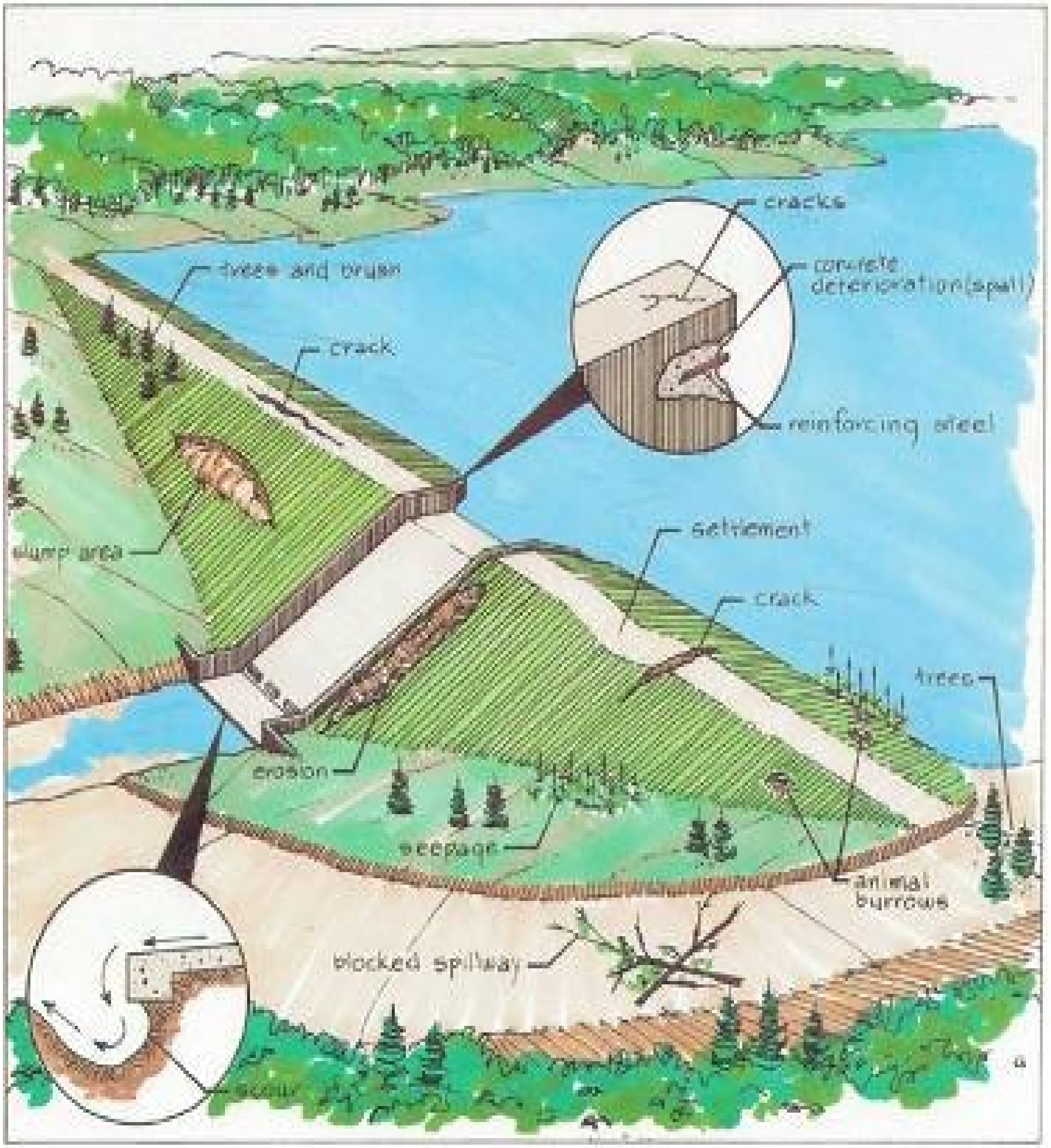
Dams also slow rivers, which is another problem for aquatic organisms. They depend on steady flows to guide them, and become disoriented in stagnant reservoir pools, which oftentimes increased the duration of their migration. Dams also impact water quality by changing the temperature and oxygen levels of the water. For example, slow-moving reservoirs result in increased temperatures which affect sensitive species (American Rivers 2018).

2.6.2 Maintenance

The owner of a dam is responsible for maintaining and operating the dam in a safe condition always so it does not constitute a hazard to life, health, or property. A good maintenance program will protect a dam against deterioration and prolong its life.

Dam owners can do visual inspections on their own. It is recommended that dam owners inspect their dam at least once every three months and after significant storm events. It is important to keep records throughout the life of the dam as accurate records can help in the evaluation of the performance and condition of the structure over time.

While inspecting the dam, the dam inspector should traverse the entirety of the structure. A few items to look for while inspecting the dam are as follows: settlement, turbid discharge, structural cracking, foundation movement, erosion, sinkholes, vandalism, animal burrows, boils, depressions, voids, debris in gates and spillways, wave erosion, excessive vegetation, seeps, and soil displacement on slopes (NYSDEC 1987).



Signs of deterioration in dams. Source: British Columbia Dam Safety Guidelines.

Sometimes maintenance is immediately needed. According to the Owners Guidance Manual for the Inspection and Maintenance of Dams in New York State, the following conditions are critical and need immediate attention:

- A dam about to be overtopped or being overtopped
- A dam about to be breached (by progressive erosion, slope failure, or other circumstances)
- A dam showing signs of piping or internal erosion indicated by increasingly cloudy seepage or other symptoms
- A spillway being blocked or otherwise rendered inoperable, or having normal discharge restricted
- Evidence of excessive seepage appearing anywhere at the dam site (an embankment becoming saturated, seepage exiting on the downstream face of a dam) increasing in volume

An emergency action plan should be developed in advance and then activated when conditions like this occur. Usually a professional engineer is required to solve these types of situations. These are several other tasks that should be performed continually to keep the dam in good condition (NYSDEC 1987):

- Routine mowing
- Filling of any cracks and joints on concrete dams
- Observation of any springs or areas of seepage
- Inspection of dam (as discussed earlier)
- Monitoring of development in the watershed which would materially increase runoff from storms
- Monitoring of development downstream and updating the emergency notification plan to include new homes or other occupied structures within the area

2.6.3 Dam Failure

Dam failure can be attributed to many complex reasons- both structural and non-structural. Sometimes the cause is directly tied to the design and construction process, as well as inadequate maintenance or operational mismanagement. Failures can also result from natural hazards. The following sections discuss dam failure caused by natural hazards and structural inadequacy as discussed by NYSDEC (1987):

Natural Hazards

There are several different types of natural hazards that may cause dam failure, including:

- Flooding from high precipitation
- Flooding from dam failure
- Earthquakes
- Landslides

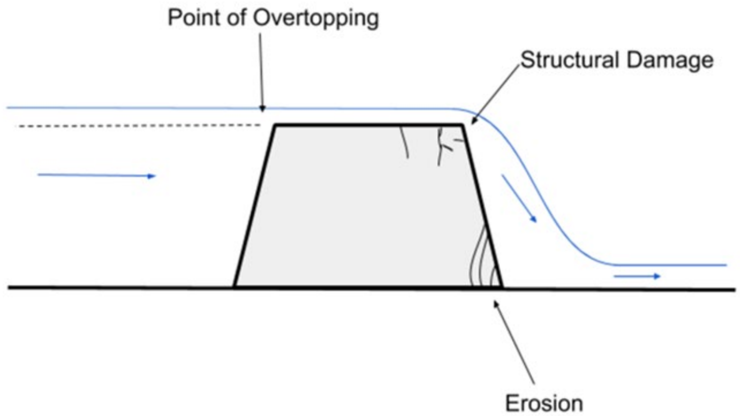
Floods are the most pertinent natural hazard in the northeastern United States. Flood-plain areas are more prone to flooding and should be included in the risk assessment for dam failure. When a dam receives a sudden surge of water caused by a natural flood, it will usually exceed the maximum flood expected naturally. This can put the dam at risk for failure. People and property are more at risk during a flood caused by dam failure than a natural flood. Loss of life and damage almost always increases (NYSDEC 1987).

Structural Failure

According to NYSDEC (1987), there are three categories of structural failure: overtopping by flood, foundation defects, and piping. They are discussed below.

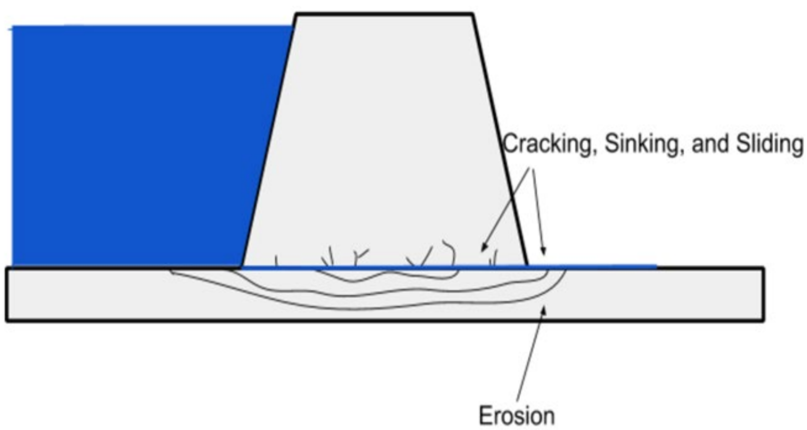
- **Overtopping by Flood:** Overtopping may develop from many sources, but often evolves from inadequate spillway design. Possibly even an adequate spillway may become clogged with debris. In either case, water pours over other parts of the dam, such as abutments or the dam toe and erosion and failure follow. Once erosion has begun during overtopping, it is extremely difficult to stop

(NYSDEC 1987). Overtopping accounted for 70.9% of all dam failures in the United States from 1975-2011 (FEMA 2013).



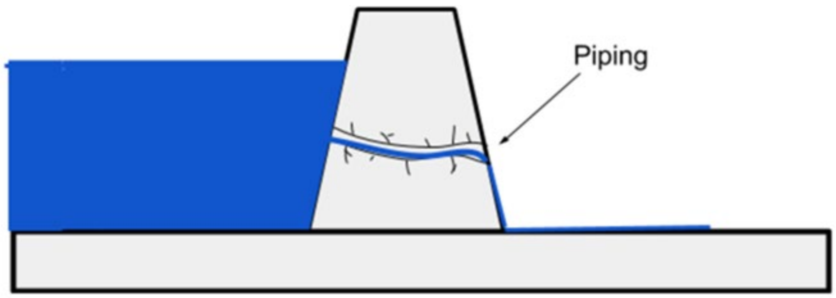
Overtopping can cause structural damage and erosion. Source: Ulster County Department of Environment.

- **Foundation Defects:** Foundation defects can occur for multiple reasons. It could be due to inadequate initial design, failure to assess the regional geology properly, poor construction, or gradual degradation and weakening over time. Foundations may be weakened internally as well due to internal piping or internal erosion. Concrete dams are most susceptible to foundation failure and can occur with the loss of the entire concrete dam structure. Typical warning signs include cracking and settlement (FEMA 2013).



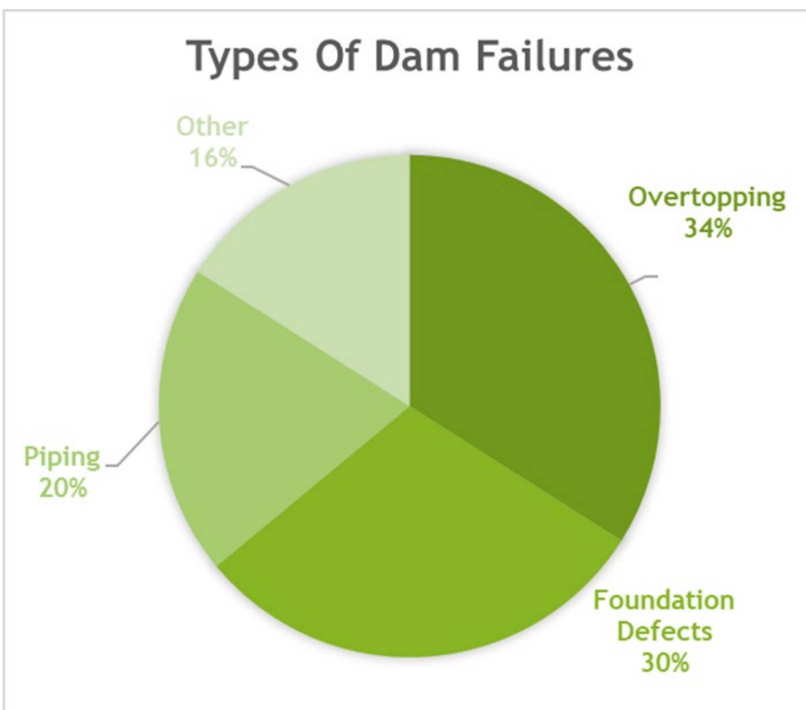
Foundation defects can cause erosion, cracking, sinking, and sliding. Source: Ulster County Department of Environment.

- **Piping:** Piping is internal erosion of an earth dam that takes place when water seeps through the dam and carries soil particles away from the embankment, filters, drains, foundation or abutments of the dam. Piping can lead to a complete failure of the structure. Signs of piping include an increased seepage flow rate, the discharge of muddy or discolored water below the dam, sinkholes on or near the embankment, and a whirlpool in the reservoir. Earth dams mainly suffer from seepage and piping. Piping accounted for 14.3% of all dam failures in the United States from 1975-2011(FEMA 2013).



Piping can allow water to seep through the dam and may possibly cause failure. Source: Ulster County Department of Environment.

Failure also depends on the type of dam. Gravity dams are the safest, followed by arch and fill dams. Buttress dams are the most unsafe (NYSDEC 1987).



Source: Association of State Dam Safety Officials, 2009

Section 3: Best Management Practices

Source: Tim Koch, Ashokan Watershed Stream Management Program

3.1 General Recommendations

Graphic Source: climate.copernicus

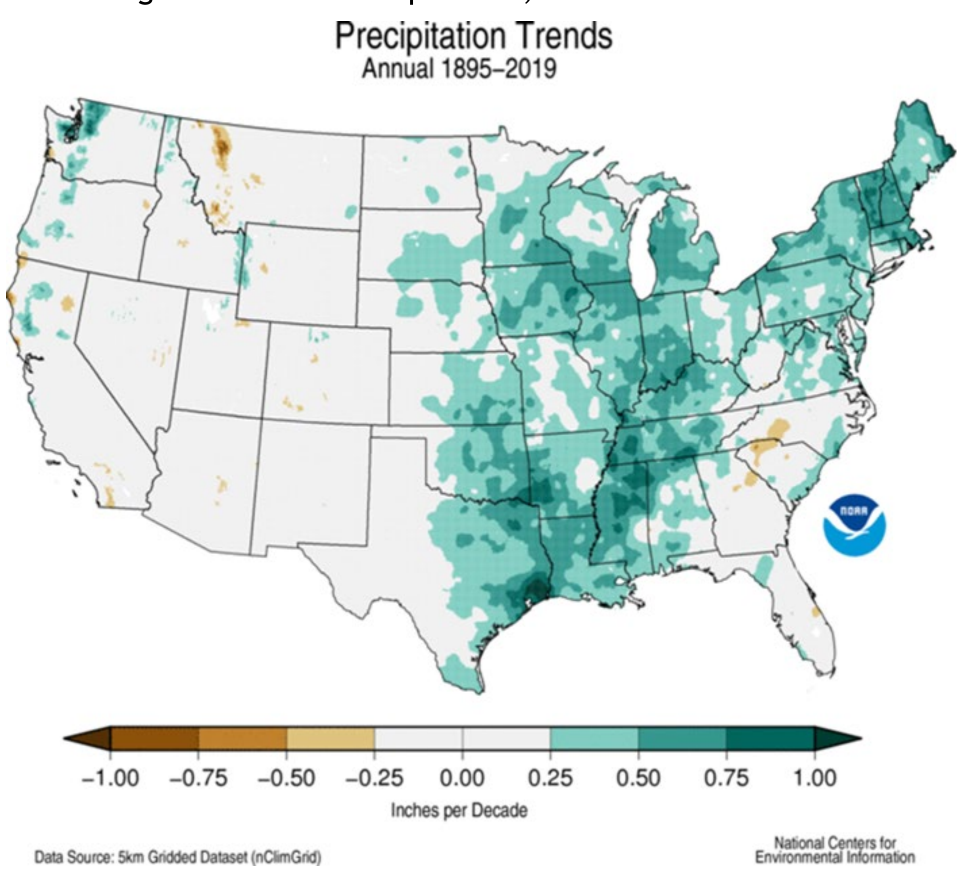
Road-stream crossings that are poorly designed can become a safety risk to both humans and aquatic animals. Many factors are involved in the process of creating adequate RSXs. In the sections below, general recommendations on how to make RSXs less impactful on the surrounding environment are suggested.

3.1.1 Build RSXs that Allow for Natural Stream Function

RSXs that are designed to conserve stream shape and processes accomplish multiple benefits- these structures reduce long-term maintenance costs, risk of failure during large floods, and restore stream habitat connectivity (Forest Service Stream-Simulation Working Group 2008). Flood risk and habitat barriers at non-bridge RSXs are often seen together. Minimum intervention in the stream process results in the least risk for both flooding and affecting aquatic organisms negatively, as the crossing can accommodate a large range of flood discharges and sediment/debris inputs without compromising aquatic organism passage. It's a simple approach and often saves communities in the long-term. Whenever possible, build RSXs that allow for natural stream function upstream, downstream and within the structure.

3.1.2 Keep Up to Date With the Latest Hydrologic Data

Climate change has created a greater likelihood of intense rainfall and extreme precipitation events in northeastern U.S.



Source: National Oceanic and Atmospheric Administration.

towns. It is likely that many structures were designed with historical hydrologic data and are more susceptible to flood risk. This trend is expected to continue as climate change progresses, which makes it imperative that hydrologic data for future storms are incorporated when designing RSXs.

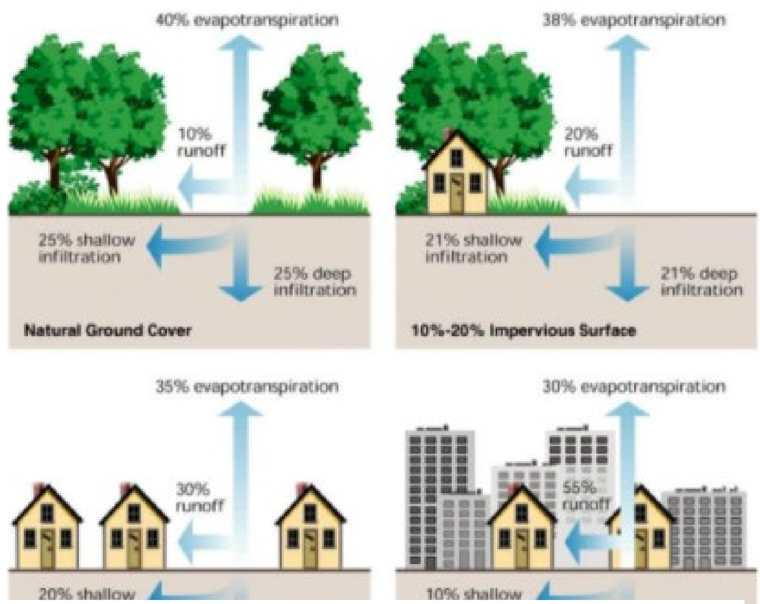
Graphic Source: flaticon.com

3.1.3 Track Maintenance and Replacement Projects

Any inventory or maintenance records should be updated regularly to reflect changing stream and structure conditions as well as ongoing maintenance and replacement projects. This is important for internal record-keeping and continuation of knowledge between staff and for accessing funding for upgrades and replacement projects

3.1.4 Consider Implementing Green Infrastructure Upstream of Undersized Structures

Heavily developed areas often have poor stormwater drainage due to large amounts of impervious surfaces. Impervious surfaces, like roofs, roads and parking lots, prevent runoff from soaking into the ground as it would in undeveloped areas. Instead, runoff is more likely to drain into a stream channel. This results in higher peak flows, which puts more strain on RSXs that are undersized and increases flood risk. Green Infrastructure can help capture and infiltrate stormwater runoff before it reaches the stream channel, which helps reduce flood risk for inadequate RSXs.



Changes in proportion of rainfall that becomes runoff in different IC scenarios. Source: HVA and LHCCD. See appendix F for more details.

3.1.5 Climate Smart Communities Program

Background

The Climate Smart Communities (CSC) Program began in 2009 as an interagency initiative of New York State. The CSC Program is jointly sponsored by the following six New York State agencies: Department of Environmental Conservation (DEC); Energy Research and Development Authority (NYSERDA); Department of Public Service; Department of State; Department of Transportation; Department of Health and the Power Authority (NYPA). DEC administers the program.

The goals of the CSC Program are to engage and educate local governments in New York State, provide a robust framework to guide their climate action efforts, and recognize their achievements as they make progress. Participation in the program is voluntary and is designed to encourage ongoing planning and implementation of actions that reduce of greenhouse gas emissions and help communities adapt to the effects of climate change.

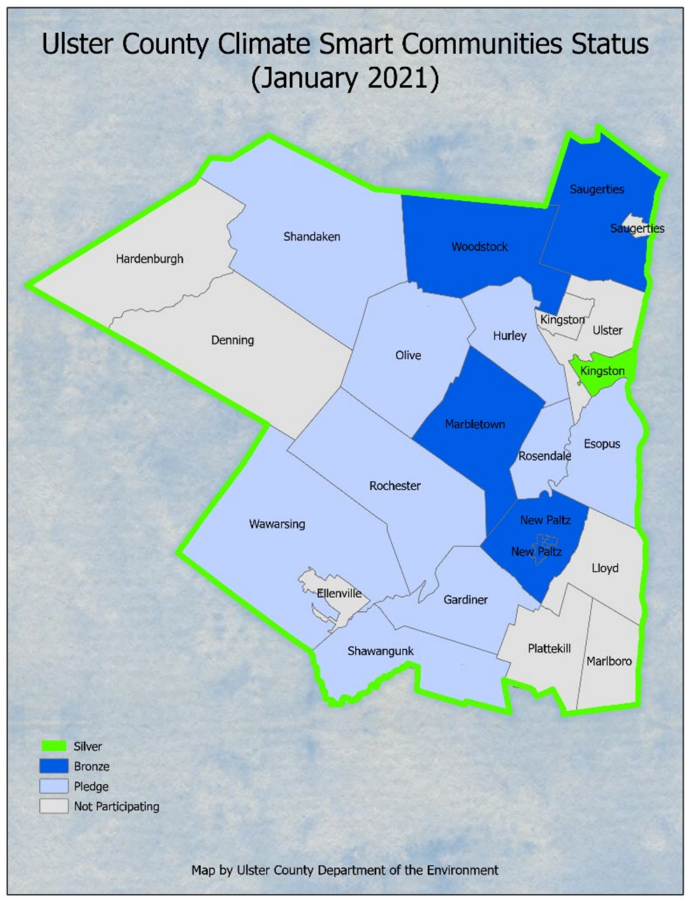
CSC Certification

CSC certification represents the next step in the evolution of the program and provides specific guidance on how to implement the CSC Pledge, adoption of which is the first step to participation in the CSC Program. In order achieve CSC certification, a municipality must go beyond adoption of the CSC Pledge by completing and documenting a suite of actions that mitigate and adapt to climate change at the local level. The CSC certification program recognizes communities for their accomplishments through a rating system leading to three levels of award: bronze, silver, and gold.

There are over 120 CSC actions available for municipalities under the program, with detailed information, resources, and examples available for each. The actions are organized under the Pledge Elements outlined in the CSC Pledge, and applicants can earn additional points by demonstrating innovation or high levels of performance under the “Innovation” and “Performance” categories:

CSC Pledge Elements

1. Build a climate-smart community.
2. Inventory emissions, set goals, and plan for climate action.
3. Decrease energy use.
4. Shift to clean, renewable energy.
5. Use climate-smart materials management
6. Implement climate-smart land use.
7. Enhance Community Resilience to Climate Change.
8. Support a green innovation economy.
9. Inform and inspire the public.
10. Engage in an evolving process of climate action.
11. Innovation
12. Performance



Source: Ulster County Department of Environment.

CSC Portal

As participation in the CSC Program has grown since its inception, the web-based CSC Portal (https://climatesmart.ny.gov/) increasingly serves as a resource for municipalities seeking information and guidance on the hundreds of CSC actions available to them, as well as a repository of the documentation submitted by each community achieving CSC certification. The full Certification Reports for all certified CSCs can be filtered by individual municipality, or by specific CSC actions in the "Participating Communities" section of the Portal.

Local CSC Engagement

Ulster County: Ulster County was the first County to achieve Silver-level CSC certification in 2016, a notable achievement, and the CSC Program serves as a framework for the County's climate action initiatives. The County continues to work towards implementing more of the identified actions in the CSC Program and has used the Program in part to guide actions identified and prioritized in the roadmap section of the Ulster County Government Operations Climate Action Plan (2019).

The County will be applying for its first five-year Silver-level CSC recertification in 2021. The County RSX Management Plan developed as part of these assessment projects will be included in the County's CSC recertification application under the PE7 Action: Culverts and Dams (updated November 2020), as will relevant implementation projects.

PE7 Action: Culverts and Dams: Points for this action are tiered based on completion of the components described below. All must have occurred within ten years prior to the application date. For more information, see Appendix G.

- Conduct an assessment of all RSXs that fall under the responsibility of the local government using the NAACC protocol (2 points)
- Develop a RSX municipal management plan that prioritizes crossings for replacement based on threats to flooding and aquatic connectivity (2 points)
- Right-size at least one culvert or bridge. It must not be a barrier to aquatic connectivity and must be sized to future climate projections (e.g., to the standards recommended in the Draft NYS Flood Risk Management Guidance). A maximum of 12 points is available for 2 (or more) right-sizing projects (6 points per project)
- Conduct a dam inventory (2 points)
- Remove one or more dams identified as barriers to aquatic connectivity and/or are in hazardous condition (6 points)

Future culvert and bridge upgrades or replacements and dam removals could also be documented for additional points under the implementation component of the action outlined above.

Additionally, the local RSX Management Plans developed as part of this project in collaboration with the Towns of Kingston, Saugerties, and Woodstock could potentially be used by each Town towards their individual CSC certification (or recertification) documentation, as could relevant local implementation projects.

Local Municipalities

In addition to the County's active participation in the CSC Program, there is significant engagement by local municipalities within the County. The Town of Saugerties passed the CSC Pledge in 2010, achieving bronze-level CSC certification in March 2020, and Town of Woodstock passed the CSC Pledge in 2016, achieving bronze-level CSC certification in September 2020.

These are among many local municipalities with varying levels of participation, with some considering adoption of the CSC Pledge as a first step, others with actively engaged CSC Task Forces, and some having also achieved CSC certification. These include the City of Kingston, which achieved its five-year Silver-level recertification in 2020, and the Town and Village of New Paltz and the Town of Marbletown, which all achieved bronze-level CSC certification in 2020. The County Department of the Environment maintains a webpage which provides updated information on both the County and local CSC Program participation and available resources (https://ulstercountyny.gov/environment/climate-smart).

3.1.6 Flood Risk

In August 2020, New York finalized its State Flood Risk Management Guidance (SFRMG). This guidance was developed as an outcome of the *2014 Community Risk and Resiliency Act* (CRRA), which tasked numerous State departments and programs to enhance resilience across New York to rising sea levels and extreme flooding in the future.

Although this guidance did not establish any legally binding standards for structures or permitting of, it provided recommendations to agencies and municipalities to consider predicted future flows and flood levels for future projects. NYSDEC and other state agencies that may provide funding for or permitting of structures (such as culverts) are now expected to consult the SFRMG as they consider applications. This new requirement now ensures that applicants, such as municipalities, have demonstrated at least a consideration of sea-level rise and future flows/flooding in their application.

The SFRMG acknowledges the importance of culverts, for example, as an integral part of communities, and the State as a whole, in becoming more resilient to our changing climate. In alignment with the 2016 NYSDOT Design Manual, the SFRMG recommends that a design future/flow multiplier of 120% be added to the current design flow in our region of the State for any culvert with an end of life design between 2025-2100. Further, the SFRMG recommends that transportation infrastructure, such as culverts, bridges, and even roadways, be defined as either "critical" or "non-critical" depending upon its importance during a flood event. As you might expect, the more critical the piece of infrastructure is, the higher (more protective) the recommended design standard should be. For example, the design flow for “critical” culvert should either be the 0.2% annual chance flood (Q500), or the current design flow (such as Q50) plus the future flow multiplier, whichever is greater.

The SFRMG document also makes it clear that site conditions, natural resources, size/scale, adjacent lands use, and other factors often complicate project design and construction. Therefore, application of the highest flood-risk management guideline is not warranted or practical in all cases. Design flow elevations or capacities that municipalities incorporate into design and risk-assessment protocols should include other relevant factors, such as feasibility, project cost, costs of flooding, funding eligibility, risk tolerance, environmental effects, and historic preservation.

3.2 Installing and Replacing Culverts

The next few sections discuss how to design and construct RSXs without altering natural stream channel.

3.2.1 New York Stream Crossing Guidelines

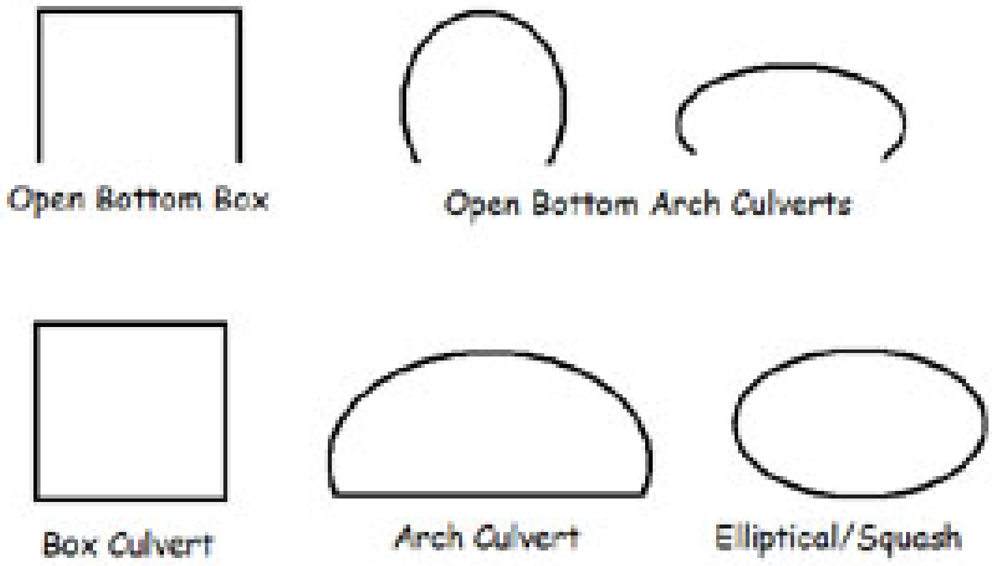
The following recommended standards are the current New York Stream Crossing Guidelines (NYSDEC, n.d.). This guideline is provided on the NYSDEC website and is effective for reducing stream barriers and impediments to fish and wildlife.

The following recommendations are to assist in designing, installing, and replacing stream crossing structures in small streams, with the goal of protecting stream continuity. Pre-installation stream conditions should be retained to the maximum extent possible. Structures should be designed and installed so that the natural stream flow and bottom substrate are mimicked throughout the crossing and so that the structure does not constrict or fragment the stream. Additional engineering design may be necessary to ensure structural integrity and appropriate hydraulic capacity.

Types of Crossings

Bridges and open bottom box culverts are the preferred crossing method. Other methods, in descending order of preference, include open-bottom arch culverts (typically installed on concrete footings), box culverts (typically pre-cast concrete), arch or elliptical/squash culverts (metal, concrete, or plastic), and circular culverts (metal, concrete, or plastic).

The structure should be located within a stretch of watercourse where the channel is straight, unobstructed, and well defined. When selecting a crossing location, choose a straight, flat area where the streambed/bank characteristics can be easily retained or replicated, and erosion potential can be minimized. Areas where wetlands exist along the stream should be avoided when possible.



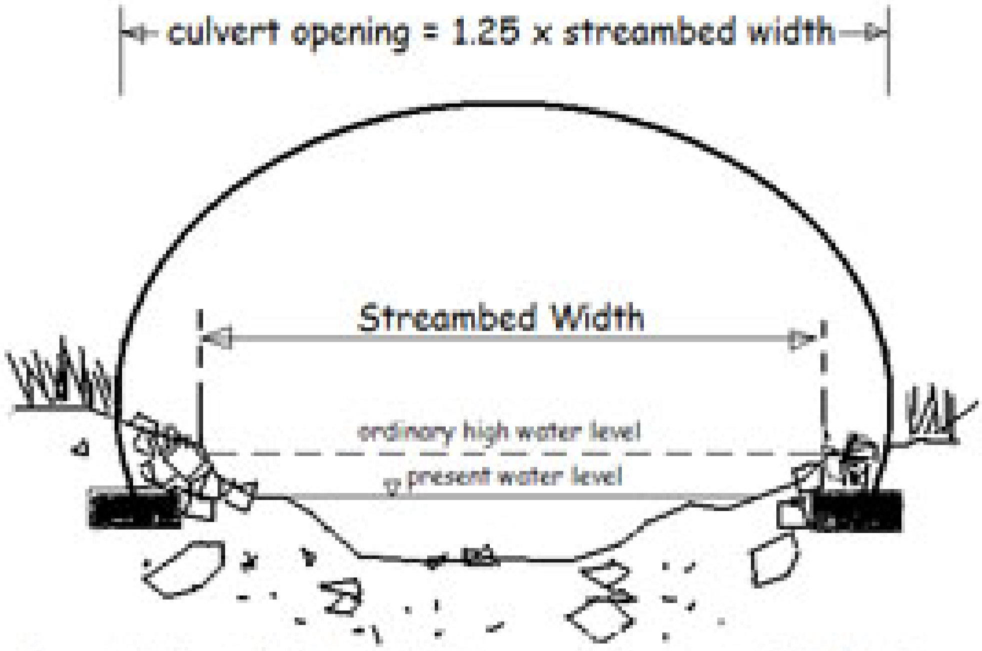
Different types of crossings. Source: NYSDEC

Length and Side Slopes

Road and shoulder widths should be the minimum necessary for the crossing and side slopes should be as steep as possible without compromising stability to minimize the length of the culvert. Note: A side slope grade of 2:1 is typically the steepest grade that can be vegetated.

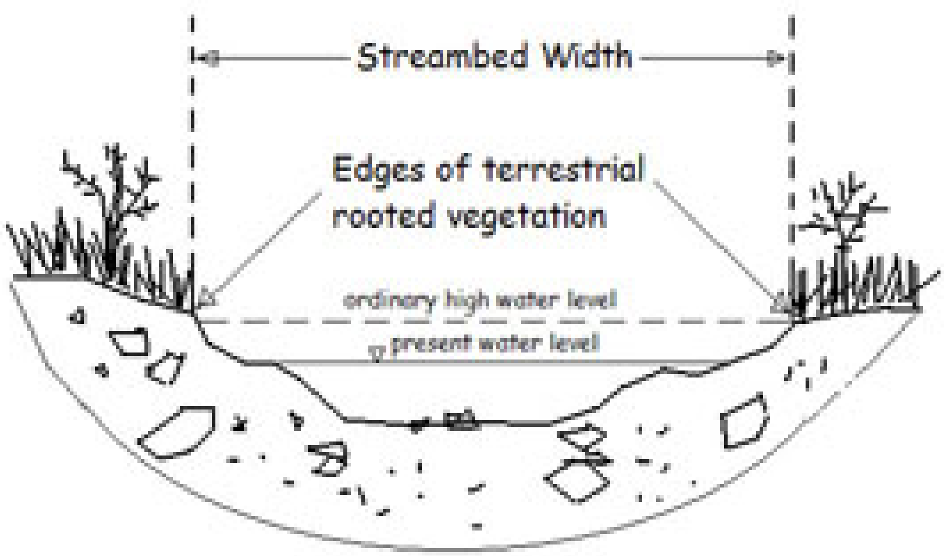
Capacity/Size

The width of the structure should be 1.25 times the normal width of the streambed. The overall culvert capacity should be able to accommodate expected high flows.



Correctly installed open-bottom arch culvert with footings

Source: NYSDEC



Determining Streambed Width

Source: NYSDEC

Installation

For "closed-bottom" culverts, the streambed slope must be less than 3% (3-foot vertical rise in 100 feet of channel length), and the culvert installed level with at least 20% of the vertical rise embedded at the downstream invert.

Culvert installation should take place "in the dry", to facilitate construction and reduce downstream impacts from turbidity and sedimentation. This may require piping or pumping the stream flow around the work area and the use of cofferdams. The duration of dewatering should be kept to a minimum and flows immediately downstream of the worksite should equal flows immediately upstream of the worksite.

Erosion Control

Rip rap should be used as head wall protection to prevent scouring around the inlet and outlet of the culvert. High flows can erode the soil surrounding the inlet and the soil underneath the outlet of a culvert. Both instances can cause culvert undermining and can adversely affect the structural integrity of the road crossing.

Appropriate erosion and sediment controls, including silt fencing, should be installed parallel to the stream to prevent downstream impacts and should be depicted on project plans.

Disturbance of the streambed and banks should be limited to that necessary to place the culvert. Effected bank and bed areas should be restored to pre-project conditions following installation of the culvert and the banks should be planted with native vegetation, consistent with that which existed prior to the culvert installation. Seeded banks should be covered with mulch to accelerate plant growth.

Timing

To protect fish spawning, timing restrictions may be imposed for all instream work as well as any adjacent work that may result in suspension of sediment in a stream. In general, instream work should occur during low flow conditions, typically between June and September, to minimize impacts to fisheries and water quality. For additional information on timing restrictions, please contact the regional NYSDEC office (Region 3 for this project area).

Maintenance

It is recommended that stream crossing structures be maintained at least once annually, preferably before high spring flows. Typical maintenance includes checking for structural deficiencies such as undermining and debris buildup.

NYSDEC Permits

Permits are required for streams classified as C(T) or higher quality (ECL Article 15-0501), navigable bodies of water (ECL Article 15-0505), and NYSDEC regulated wetlands (ECL Article 24). For additional information, please contact the regional NYSDEC office.

NYSDEC Region 3 contact information:

- Phone: 845-256-3054
- E-mail: dep.r3@dec.ny.gov

Regional Permit Administrator:

John Petronella
NYSDEC
21 South Putt Corners Rd.
New Paltz, NY 12561-1620
845- 256-3054

Permits may also be required from other agencies. These may include, among others:

- U.S. Army Corps of Engineers

3.2.2 Green Stormwater Infrastructure

Another way to reduce flood-risk is to invest in green stormwater infrastructure. Green stormwater infrastructure diminishes harmful stormwater runoff. Stormwater runoff is a major cause of water pollution due to the large amount of manmade structures that block rain from soaking into the ground as it should. As well as being harmful by carrying trash, bacteria, heavy metals, and other pollutants into the landscape, higher flows resulting from heavy rains can cause erosion and flooding in urban streams, damaging habitat, property, and infrastructure. It can protect from costly damage that may occur from flooding. In areas that are undeveloped, the water is absorbed and filtered by soil and plants and thus stormwater runoff is cleaner and less of a problem. Green stormwater infrastructure uses vegetation, soil, and other practices to restore the environment. Green infrastructure can include rain gardens, rooftop disconnects, bioretention areas and basins, vegetated swale, previous surfaces, rain cisterns and green roofs. This type of infrastructure will be most effective in areas that are heavily developed and have many RSXs. By funding green infrastructure projects, money will be saved in the way of damaged crossings, infrastructure and personal injury that could all result from a failed and/or flooded RSX (NYSDEC 2020).

An example of a bioretention area at the Ulster County Department of Environment. Source: Ulster County Department of Environment

Section 4: Culvert Prioritization

Source: Tim Koch, Ashokan Watershed Stream Management Program

4.1 How to Use Data

4.1.1 Survey ID

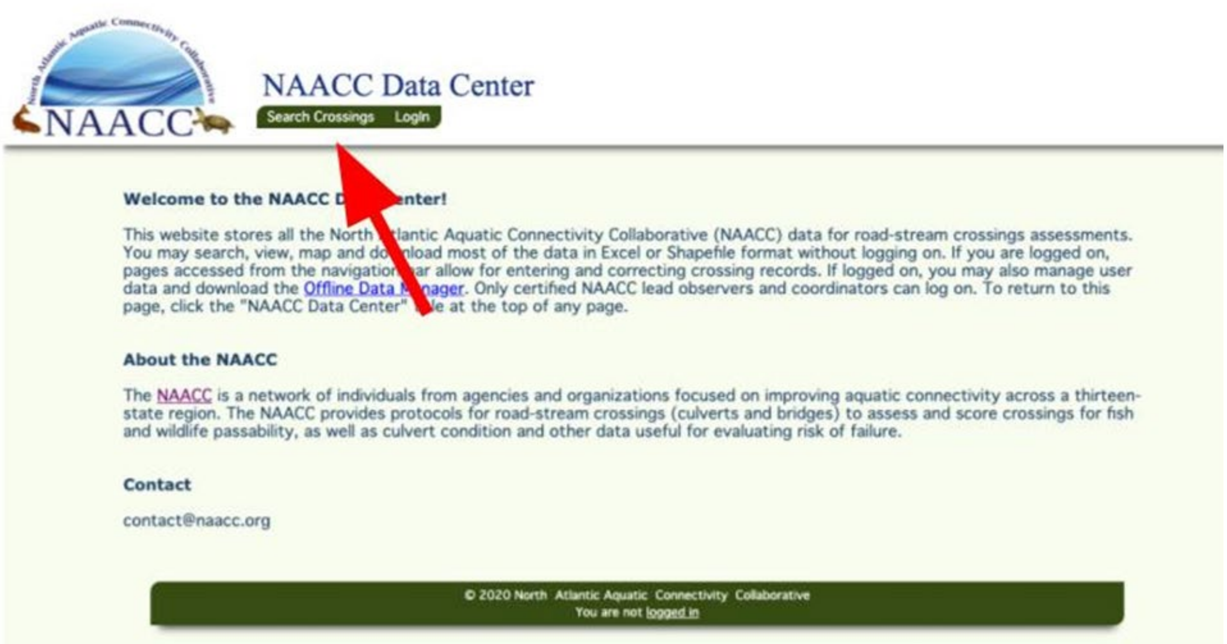
Each RSX has a survey ID this can be used to look up a crossing in the NAACC Database www.naacc.org.

Note: Each RSX has an additional ID labeled “Culvert_ID”. The culvert ID cannot be used to look up the crossing. This is *not* to be confused with the survey ID.

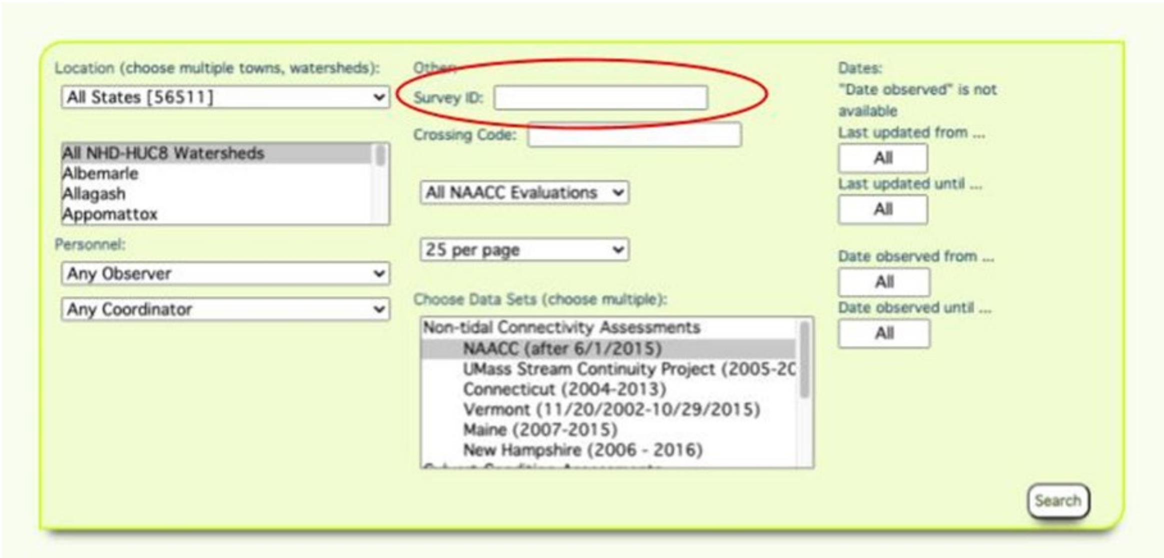
Survey ID

The survey ID is a numeric label automatically assigned to each crossing when uploaded to the NAACC database. It is NAACC specific and can be used to look up the RSX on the NAACC website. A link to website can be found here: https://naacc.org/naacc_search_crossing.cfm

Once on the NAACC website, click “Search Crossings” located near the upper left corner.

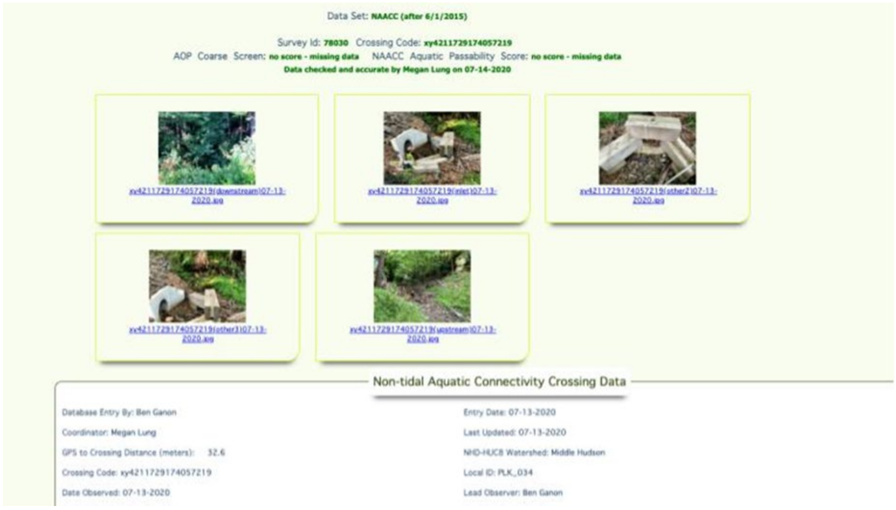


On the search page there are multiple filter options. To find a specific culvert, enter the survey ID in the “Other: Survey ID” search bar.



The results will be displayed at the bottom of the page.

Clicking the crossing code will open a page containing data collected in the field, as well as photos of the crossing.



Crossings can also be located by searching by State and Town, watershed, or by Observer (person who performed the assessment). After searching the crossings can be viewed by clicking on the Crossing Code in the list, or by mapping with the "Map with Google Maps" button, then clicking on the crossing on the map.

4.2 Navigating the Scoring

NAACC

Aquatic Organism Passage (AOP): The AOP Score is calculated for each crossing using numerous variables within the NAACC survey, such as constriction and outlet drop, that are observed in the field. A categorical assessment (titled 'Evaluation') is assigned to the numeric AOP Score (No Barrier, Insignificant Barrier, Minor Barrier, Moderate Barrier, Significant Barrier, and Severe Barrier). The lower the AOP Score, the more severe the crossing is as a barrier to aquatic organisms. Crossing Condition can be used as a proxy for the condition of the structure, with poor signifying the structure is in poor condition. For more information, see Appendix A, https://streamcontinuity.org/ or, www.naacc.org.

4.3 Multi-Jurisdictional Hazard Mitigation Plan Projects

Hazard mitigation plans help develop long term strategies for protecting people and property from future natural disasters. Considerations of the impacts of RSXs may be included in these plans. Road stream crossing replacement projects can be excellent candidates for Hazard Mitigation Plan projects as they are an integral part of transportation networks.

The current Ulster County Hazard Mitigation Plan is available at: https://ulstercountyny.gov/emergency-services/hazard-mitigation/draft-plan-updatemis

Section 5: Funding & Resources

Source: Tim Koch, Ashokan Watershed Stream Management Program

5.1 Federal Funding

FEMA Hazard Mitigation Assistance Grants

FEMA Hazard Mitigation Grants assists in implementing long-term hazard mitigation planning and projects to reduce or even eliminate long-term risk to people and property from future disasters. They provide funding for eligible mitigation measures that reduce disaster losses.

More information is provided at: https://www.fema.gov/grants/mitigation

FEMA Building Resilient Infrastructure & Communities (BRIC)
FEMA Building Resilient Infrastructure & Communities provides funding for communities looking to implement hazard mitigation projects to protect themselves from natural disasters. BRIC program aims to fund projects that are research-supported, proactive investments and predicts to fund projects that have innovative approaches to partnerships, such as shared funding mechanisms, and/or project design. Eligible projects have to have been included in the community's mitigation projects list in the current FEMA-approved hazard mitigation plan.

- Who is Eligible: All 50 states, U.S. territories, federally recognized tribal governments, and District of Columbia
- Award: Up to $600,000 per applicant
- Due Date: January 29, 2021, 3 p.m. ET
- Contact: Marlene M. White - (518) 292-2375 - Marlene.White@dhses.ny.gov
- Website: https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities

National Fish and Wildlife Foundation: Bring Back the Natives grant program
Bring Back the Natives program provides funding to projects that produce measurable outcomes for native fish species of conservation concern. Priority projects will address the leading factors in native fish species decline such as habitat alteration, environmental change, and invasive species.

- Who is Eligible: local, state, federal, and tribal governments and agencies, special districts, non-profit 501(c) organizations, schools and universities.
- Award: Up to $510,000 in grant funds is available. Grants usually range from $50,000 to $100,000.
- Contact: Kristin Neff - (303) 222-6482 - Kirstin.Neff@nfwf.org
  Kate Morgan - (202) 595-2469 - Katherine.Morgan@nfwf.org
- Website: https://www.nfwf.org/programs/bring-back-natives

United States Department of Agriculture: Emergency Watershed Protection Program (EWP)

The EWP program, a federal emergency recovery program, helps local communities recover after a natural disaster. According to the EWP Program webpage, the programs offers "technical and financial assistance to help local communities relieve imminent threats to life and property caused by floods, fires, windstorms and other natural disasters that impair a watershed". EWP does not require a disaster declaration by federal or state officials for program assistance to begin, but partial funding must be provided by the sponsor (Eligible sponsors are listed below). The EWP Program cannot be used to address problems that existed before disaster.

- Who is Eligible: Cities, towns, counties, conservation districts, or any federally-recognized Native American tribe or tribal organization. Public and private landowners can also apply for the EWP Program through those sponsors.
- Contact: Paula Bagley – (607) 865-7090 – paula.bagley@usda.gov
- Website: https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/ewpp/

5.2 State Funding

Cornell Local Roads Program

The Cornell Local Roads Program provides support for municipalities managing local highways and bridges in NYS. Their mission statement states:

"The Cornell Local Roads Program provides unbiased, timely and exceptional technical assistance and training to highway and public works departments across New York State to help improve the quality and safety of roads and streets. We support local communities through strong collaborations with partners that enhance the sustainability of local highway assets."

They provide multiple services, which are primarily training classes, as well as some additional resources like an online library containing publications, videos, and software pertaining to highway and bridge management. Training classes even include a Highway School for Highway superintendents. CLRP is the Local Technical Assistance Program for NYS and is funded by the Federal Highway Administration, New York State Department of Transportation, Cornell University, and participant training fees. More information can be found on https://www.clrp.cornell.edu/clrp/about.html

NYS Consolidated Funding Application

New York State's Consolidated Funding Application (CFA) allows communities to apply for multiple funding projects with just one application. This program was created to make the grant application process easier for communities and serves as a way to reach multiple state funding sources through a single place.

- Website: https://regionalcouncils.ny.gov/cfa

Project opportunities that can be applied for through this application include:

Green Innovation Grant Program

The Green Innovation grant program provides funding for projects that improve water quality and administer green stormwater infrastructure in New York State. As stated on the Green Innovation grant program website, they seek to selects project that “maximize opportunities to leverage the multiple benefits of green infrastructure, spur innovation in the field of stormwater management, build capacity to construct and maintain green infrastructure, and/or facilitate the transfer of new technologies and practices to other areas across the State”.

- Who is Eligible: Municipalities, private entities, state agencies, and soil and water conservation districts.
- Award: Grants will be awarded a minimum of 40% up to a maximum of 90% of eligible project costs.
- Contact: Brian Hahn (Manager of Green Policy, Planning and Infrastructure) - (518) 402-6924 - GIGP@efc.ny.gov
- Website: https://www.efc.ny.gov/GreenGrants

New York State Department of Environmental Conservation (NYSDEC)

The NYSDEC is a state agency focused on the conservation, enhancement, and enjoyment of environmental resources. Contact: NYSDEC - (518) 402- 8270

The NYSDEC provides funding for the following projects:

Hudson River Estuary Program Grants

The Hudson River Estuary Program grant provides communities with funding to support projects that promote clean water quality, resilience of communities, river scenery, and conservation of fish, wildlife and their habitats. According to their website, NYSDEC provides funding through the Hudson River Estuary Program to implement Hudson River Estuary Action Agenda priorities. The opportunities are announced as Request for Applications (RFAs) through the Hudson River Estuary Grants Program or as Request for Proposals (RFPs) through the New England Interstate Water Pollution Control Commission (NEIWPCC).

- Who is Eligible: Governmental entities, municipalities, and quasi governmental entities
- Contact: Susan Pepe (Grants Manager) - HREPGrants@dec.ny.gov
- Website: https://www.dec.ny.gov/lands/5091.html

Climate Smart Communities (CSC) Grants
The Climate Smart Communities grants provide 50/50 matching grants for municipalities looking to implement projects concerning climate mitigation and adaptation. Funds are available for two broad categories- implementation and certification. Implementation projects concern the reduction of greenhouse gas emissions outside the power sector and climate change adaptation. Climate change adaptation surrounds reducing flood risk, increasing natural resiliency, extreme-event preparation, relocation or retrofit of critical infrastructure, and improving emergency preparedness. Certification projects include planning and assessment projects aligned with Climate Smart Communities Certification.

- Who is Eligible: Any county (or New York City borough) city, town, or village of the State of New York.
- Award: Implementation Projects: $10,000 - $2,000,00
  Certification Projects: $10,000 - $100,000
- Contact: Myra Fedyniak (Climate Policy Analyst) - (518) 402-8448 - cscgrants@dec.ny.gov
- Website: https://www.dec.ny.gov/energy/109181.html

BridgeNY
The BRIDGE NY program, administered by the New York State Department of Transportation (NYSDOT), is available to all municipal owners of bridges and culverts.

It will assist all phases of the project. Funding is given in a competitive manner. If selected, the project will be rated on the condition of the structure, the significance and importance of the bridge including traffic volumes, detour considerations, number and types of businesses served and impacts on commerce; and the current bridge and culvert structural conditions.

- Who is Eligible: Any city, county, town, village or other political subdivision, including tribal governments and public benefit corporations.
- Contact: BRIDGENY@dot.ny.gov

Water Quality Improvement Project (WQIP)
Water Quality Improvement Project provides funding for projects that directly concern documented water quality impairments or protect a drinking water source. WQIP can be applied for through CFA.

- Who is Eligible: Municipalities
- Contact: Division of Water - (518) 402-8179 - user.water@nyc.dec.gov
- Website: https://www.dec.ny.gov/pubs/4774.html

5.3 Local Funding

Ashokan Watershed Stream Management Program Funding for Infrastructure Improvements

The AWSMP provides funding for design and engineering of projects to reduce hydraulic constructions or treat channel instability threatening public infrastructure. Projects are developed using NYC DEP Stream Management Program design submission standards. AWSMP does not fund the replacement or maintenance of existing structures and will only fund costs related to enhancing the structure. Municipalities are more likely to receive funding if they use the Ashokan watershed RSX assessment and prioritization developed by the AWSMP.

- Who is Eligible: Municipalities
- Contact: AWSMP office - (845) 688-3047
- Website: https://ashokanstreams.org/projects-funding/

Section 6: Reference List

Source: Tim Koch, Ashokan Watershed Stream Management Program

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NAACC Stream Crossing Survey Data Form Instruction Guide

Developed by the

North Atlantic Aquatic Connectivity Collaborative

Including: University of Massachusetts Amherst
The Nature Conservancy
U.S. Fish and Wildlife Service

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For more information, go to: **www.streamcontinuity.org**

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Alex Abbott & Scott Jackson

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OVERVIEW

This document provides guidance for completing the North Atlantic Aquatic Connectivity (NAACC) Stream Crossing Survey Data Form.

The North Atlantic Aquatic Connectivity Collaborative (NAACC) is a network of individuals from universities, conservation organizations, and state and federal natural resource and transportation departments focused on improving aquatic connectivity across a thirteen-state region, from Maine to Virginia. The NAACC has developed common protocols for assessing road-stream crossings (culverts and bridges) and developed a regional database for these field data. The information collected will identify high priority bridges and culverts for upgrade and replacement. The NAACC will support planning and decision-making by providing information about where restoration projects are likely to bring the greatest improvements in aquatic connectivity.

The survey data form is to be used for an entire road-stream crossing, which may include single or multiple culverts or multiple cell bridges. On the first page, the top of the form contains general information about the crossing, and the bottom half of that page is for data on the first (or only) structure at the crossing. Subsequent pages are used to add data where there are additional culverts or bridge cells. It can be difficult to determine how best to evaluate multiple culvert/cell crossings. Please remember that it is essential to gather all of the data required for each structure (pipe or bridge cell) for accurate assessment of the entire crossing.

Stream crossing survey data can be collected digitally on a variety of devices, including tablet computers and smart phones. While data collected digitally must be reviewed before upload to the NAACC database, data upload can be done in "batches" without the need for manual entry. Paper forms can also be used, with subsequent manual data entry to the NAACC online database. Further instructions for data entry by each of these methods is provided in survey training sessions, and at www.streamcontinuity.org.

Please be sure to complete every possible element of the field data form.

SURVEY PLANNING

GENERAL PLANNING

Any effort to survey stream crossings should be based on a plan that includes answers to the following key questions:

1. ***Who is primarily responsible for managing the surveys?***
   Each NAACC state or region has a coordinator who helps decide on priority areas for survey and how to manage the data once surveys are completed. This coordinator will also plan for, oversee, and collect data from the surveys. Contact the project at contact@streamcontinuity.org for more information, or refer to the NAACC website to locate a coordinator in your region: https://www.streamcontinuity.org/participating_states.htm.

2. ***How will surveyors be trained?***
   Training should be arranged through your regional or state coordinator, and includes both classroom and field survey practice. Trainings are posted on https://www.streamcontinuity.org/about_naacc/training_prog.htm. The most important elements of training are becoming familiar with this instruction manual and gaining practice through survey of a variety of crossings with an experienced surveyor.

3. ***When should surveys be done?***
   Ideally, surveys should be conducted during low-flow periods, particularly summer and early fall.

4. ***How should we decide where to survey?***
   Consult with your regional coordinator to decide whether surveys will be conducted in one or more watersheds, towns, or counties. Plan to have maps to help you navigate to sites you plan to survey, either copies of existing maps such as the DeLorme Atlas and Gazeteer, or more sophisticated maps from a geographic information system (GIS). When collecting data digitally on a tablet computer or smart phone, survey coordinators must identify and map planned survey sites for your chosen survey area.

   For each state in the NAACC region, United States Geological Survey (USGS) HUC-12 subwatersheds have been prioritized for field surveys by the NAACC project team. These subwatersheds were prioritized based on several objectives including brook trout, diadromous fish, and the potential vulnerability of culverts to failure. These prioritized results can be a useful starting place for identifying areas to survey. In addition, there may be locally important watersheds or habitats in your state or region that may help guide location of surveys. To see the NAACC priority subwatersheds in your area, visit the web map at http://arcg.is/1F2rPJu. This web map also depicts road-stream crossings symbolized by their estimated restoration potential which can help focus survey efforts within a subwatershed.

5. ***Which sites will be surveyed?***
   Work with your state or regional coordinator to decide whether all crossings, or only certain types or sizes of streams will be considered. Some crossing surveys focus primarily on designated *perennial* streams containing most aquatic habitats, while other survey projects include all *ephemeral* and *intermittent* streams. In other cases, certain places in the watershed or town may be identified as highest priority for surveys, based on ecological or other criteria.

6. ***How will we keep track of the sites visited?***
   You should maintain records, possibly as notations on paper maps, or in a table listing each planned survey site, showing which sites have been surveyed and when. Organize your survey forms by date, and be sure each survey form is complete. Once data has been entered to the NAACC database (https://streamcontinuity.org/cdb2), you will be able to see all surveyed sites through online maps to verify that you have completed all planned crossings.

7. ***How can we access crossings on major highways, railroads and private land?***

Depending on the scope of your surveys, you should have easy access to stream crossings on most public roads, though it is important to be aware of the right-of-way to avoid inadvertently trespassing on private land. Access to interstate highways and railroads is generally much more limited. For cases with limited access to crossings, you are responsible for contacting the appropriate owner or manager of those crossings to request access to conduct surveys. Similarly, for crossings on private roads, you should make concerted efforts to notify private landowners to request permission to conduct surveys on their lands. It may help to work with a local land trust, town or county governments, or state resource agencies to gain access from these landowners, as they often have similar needs for conducting habitat surveys or other resource assessments. In some survey efforts, when allowed by specific laws in effect in those jurisdictions, it has been considered permissible to survey crossings on private roads, particularly if good faith efforts to notify landowners have been undertaken first, or so long as crossings are not on posted or gated roads.

8. ***How can we be sure our data will lead to crossing improvements?***
For your data to be useful in setting stream restoration priorities, we encourage you to collect data as completely and accurately as possible and ensure that the data are entered properly into the database. Finally, be sure that all data, including survey forms and site photographs, whether collected digitally or on paper, are transmitted to your state or regional coordinator for archiving.

SAFETY

Streams can be hazardous places, so take care to sensibly evaluate risks before you begin a survey at each stream crossing. While these efforts to record data about crossings are important, they are not nearly as important as your safety and well-being. Working around roads can be dangerous, so be sure to wear highly visible clothing, preferably safety vests in bright colors with reflective material; some vests have the additional bonus of containing many pockets to hold gear. Take care when parking and exiting your vehicle, and when crossing busy roads.

These surveys are best undertaken by teams of two people. This will facilitate taking measurements, making decisions in challenging situations, and recording data.

Take measurements seriously and carefully, but make estimates if necessary for your safety. Avoid wading into streams – even small ones – at high flows and entering pools of unknown depths, and take care scaling steep and rocky embankments. There are usually ways to effectively estimate some dimensions without risk. For example, an accurate laser rangefinder is a safe way to measure longer distances when conditions are unsafe, such as measuring culvert lengths through them instead of across busy roads.

EQUIPMENT

To collect data on stream crossing structures, you will need several essential pieces of equipment for measuring and recording, and some other items to keep you healthy and safe:

- ✓ **Instruction Guide for the NAACC Stream Crossing Survey Data Form** (this document)
- ✓ **Measuring Implements** in feet and tenths (decimal feet rather than inches)
    - o **Reel Tape:** For measuring structure lengths and channel widths; 100 feet.
    - o **Pocket Tape:** Best in 6 foot “Pocket Rod” version with no spring to rust.
    - o **Stadia Rod:** Telescoping, 13 feet long to measure structure dimensions such as water depth.
- ✓ **Safety Vests:** Brightly colored, reflective vests, preferably with lots of pockets to hold equipment, but most importantly to be seen on the road.
- ✓ **Waders or Hip Boots:** To stay dry, insulate from cold water, minimize abrasions, and allow access to tailwater pools and deeper streams**.**
- ✓ **Flashlight:** To be able to see features inside long dark structures.
- ✓ **Rangefinder** (optional): To safely take measurements without crossing structures, busy roadways or streams; should be accurate to within one foot for adequate data accuracy.
- ✓ **Sun Protection:** Hat, sunglasses, and sunscreen as needed.

- ✓ **Insect Repellent:** To protect from annoying or dangerous bites.
- ✓ **First Aid Kit:** To deal with any minor injuries, cuts, scrapes, etc.
- ✓ **Cell Phone:** In case of emergency, to coordinate surveys, or to ask questions of coordinators.

For Paper Surveys

- ✓ **Stream Crossing Survey Forms**: Best printed on waterproof paper. Bring along more than you expect to use. Even digital surveys should include these in case a digital device becomes inoperable.
- ✓ **Clipboard**, **Pencils & Erasers**
- ✓ **Stream Crossing Maps**: For planning sites to survey, and for recording sites assessed, a *DeLorme Atlas and Gazeteer* or similarly accurate and updated set of maps with topography is helpful for navigation.
- ✓ **GPS Receiver**: Set GPS to collect data in WGS84 datum, with Latitude and Longitude in decimal degrees.
- ✓ **Digital Camera**: Best if waterproof and shockproof, with sufficient battery power for a full day of surveying, and capable of storing approximately 100 low to moderate resolution images (approximately 100 - 500 kilobyte stored size, generally less than 1 million pixels–1 megapixel). Include batteries or battery charger, and download cable. A backup memory chip can be very useful to have on hand.

For Digital Surveys:

- ✓ **Tablet Computer:** Should be waterproof, and preferably shockproof, to be able to survive wet and rugged field conditions. Various mapping applications can be run to allow navigation to planned survey sites, replacing paper maps. For more information on this method of survey, refer to the NAACC Digital Data Collection User's Guide available at https://www.streamcontinuity.org/resources/naacc_documents.htm
- ✓ **GPS Receiver:** If not integral to the tablet computer, an external GPS device will be needed either to connect to the tablet via Bluetooth or wire, or at the least, to be able to provide correct coordinates for entering to the tablet manually.
- ✓ **Stream Crossing Survey Forms**: As a backup in case digital devices fail.

Unmapped Sites and Nonexistent Crossings

Survey teams may encounter unmapped crossings, or it may be unclear whether a crossing they have found in the field is on their map because its location does not match the map. In most cases, the surveyed crossing should be within 100-200 feet of the planned crossing. Survey teams also may encounter unmapped crossings because either the road was not mapped, as in the case of a road built to serve a new housing development, or because of an error in the road or stream data.

If there is no planned crossing near the site you are assessing, you need to assign a temporary *Crossing Code* to that crossing. A *Crossing Code* is composed of the prefix "xy" followed by the latitude and longitude of the site, with decimal degree latitude and longitude values as seven-digit numbers. For instance, a crossing located at 42.32914 degrees north and -72.67522 degrees west, will have the resulting *xy code* = "xy42329147267522," followed by the notation: "NEW XY" to indicate that this crossing site must be added to the map.

Conversely, a crossing may exist on the map but not in the field. If you try to navigate to a site and are certain that there is no crossing in the vicinity, you should select the "No Crossing" option for *Crossing Type* on the field data form. Some crossings may not actually exist due to errors in generating the crossing points. Another possibility is that there may have been a road crossing there at one time, but the crossing has been removed, but may still need to be surveyed to note passage problems. For these sites, you will select the "Removed Crossing" option. Similarly, sometimes an entire stream reach has been moved, particularly underground, in which case you will select the "Buried Stream" *Crossing Type*.

In all cases where a survey crew either cannot locate a mapped crossing or intends to add a new unmapped crossing, it is essential to check the location carefully to minimize navigation and data collection errors.

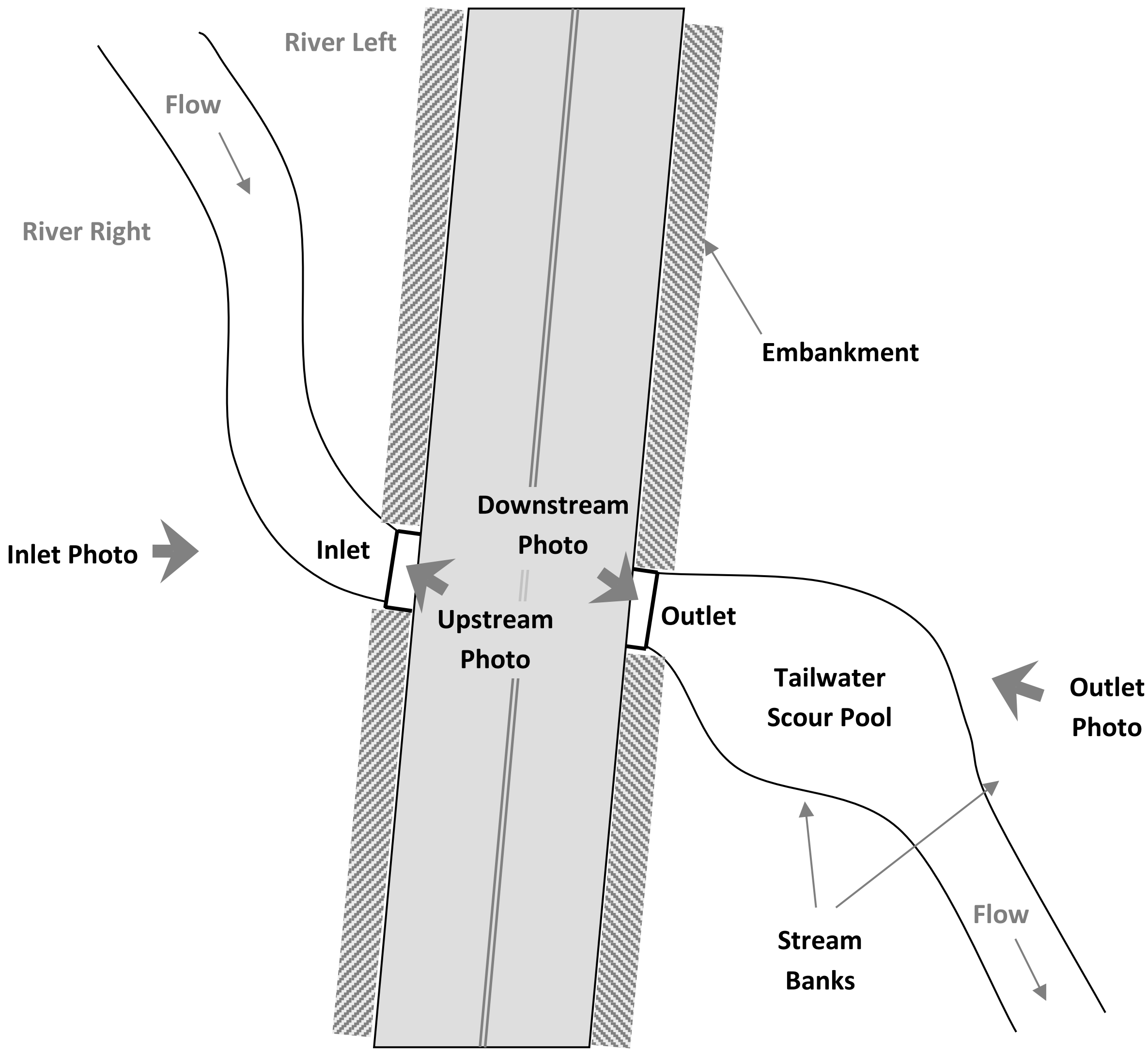
COMPLETING THE SURVEY DATA FORM

SHADED BOXES

The shading on the data form is intended to make the form easier to follow and complete. The different shading sets off elements related to certain groups of information from others.

SITE IDENTIFICATION

While each crossing will be different from others in its details, many common features will be assessed, measured, or otherwise observed during all surveys. The diagram below contains the basic terminology for key stream crossing features in a simplified overhead view.



UNDISTURBED STREAM REFERENCE REACHES

When conducting crossing surveys, elements of this data form require you to understand key characteristics of an undisturbed, "natural" section of the stream (called a *reference reach*) near where the crossing is located. These characteristics include the stream's approximate width, depth, and velocity, and the type of substrate that predominates there. In general, you will need to go a distance upstream or downstream from the crossing that is between 10 and 20 times the width of the stream to get away from the influence of the crossing. This means for a 10-foot wide stream, you will need to go between 100 and 200 feet upstream or downstream from the crossing to find an undisturbed reach. The distance will be much larger for larger streams. Note that sometimes you will be unable to locate such a reference reach, either because upstream and downstream reaches are too disturbed or modified, or because access is limited, such as by *No Trespassing* signs.

CROSSING DATA

Complete this section for the entire crossing. <u>Choose only one option</u> for the fields with checkboxes in the crossing data section.

Crossing Code: This is the 18-character "xy code" assigned to each planned survey crossing on survey maps. Be very careful to record the correct numbers, as they represent the precise latitude and longitude of the planned crossing, which can be compared with the actual location you record as GPS Coordinates below.

Local ID: Optional field for a program's own coding systems. Does NOT replace the Crossing Code.

Date Observed: Date that the crossing was evaluated, following the form *M/D/Y*.

Lead Observer: The name of the survey team leader responsible for the quality of the data collected.

Town/County: The town or county in which the assessed crossing is located according to the map.

Stream: The name of the stream taken from the map, or if not named on the map, the name as known locally, or otherwise list as *Unnamed*.

Road: The name of the road taken from the map or from a road sign. Numbered roads should be listed as "Route #", where # is the route number, with multiple numbers separated by "/" when routes overlap at the crossing (e.g., "Route 1/95"). For driveways, trails, or railroads lacking known names, enter *Unnamed*.

Road Type: <u>Choose only one option</u>:

Multilane: > 2 lanes, including divided highways (assumed paved)
Paved: public or private roads
Unpaved: public or private roads
Driveway: serving only one or two houses or businesses (paved or unpaved)
Trail: primarily unpaved, or for all-terrain vehicles only, but includes paved recreational paths
Railroad: with tracks, whether or not currently used

GPS Coordinates: Latitude and Longitude in <u>decimal degrees</u> to 5 decimal places. Use of a GPS (Global Positioning System) receiver is required, but your smart phone or tablet computer may include this capability.

Map Datum: It is best to use *WGS84* datum.

Location Format: Use Latitude-Longitude decimal-degrees (often in GPS menu as "hddd.ddddd").

You should stand above the stream centerline, and ideally on the road centerline, when taking the GPS point, but use your judgment and beware of traffic.

Location Description: If there is any doubt about whether someone could find this crossing again, provide enough information about the exact location of the crossing so that others with your data sheet would be confident that they are at the same crossing that you evaluated. For example, the description might include “between houses at 162 and 164 Smith Road,” “across from the Depot Restaurant,” or “driveway north of Smith Road off Route 193.” This information could also include additional location information, such as a site identification number used by road owners or managers.

Crossing Type: If a crossing is found at the planned location, choose the one most appropriate option.

Bridge: A bridge has a deck supported by abutments (or stream banks). It may have more than one cell or section separated by one or more piers, in which case enter the number of cells to *Number of Culverts/Bridge* Cells. Enter data for any additional cells in *Structure 2 Data*, *Structure 3 Data*, etc.

Culvert: A culvert consists of a structure buried under some amount of fill. If it is a single culvert, you need only complete the first page of the data form.

Multiple Culvert: If there is more than one culvert, you must indicate that in *Number of Culverts/Bridge Cells* to the right. Data must be entered in sections for additional structures starting on the second page (*Structure 2 Data*, *Structure 3 Data*, etc.). Count ALL structures, regardless of their size.

Ford: A ford is a shallow, open stream crossing, in which vehicles pass through the water. Fords may be armored to decrease erosion, and may include pipes to allow flow through the ford (*vented ford*).

If a planned crossing cannot be found or surveyed, the site will fit one of the following types:

No Crossing: There is no crossing where anticipated, usually because of incorrect road or stream location on maps. No further data is required. (Be sure you are in the correct location.)

Removed Crossing: A crossing apparently existed previously at the site but has been removed, so the stream now flows through the site with no provision for vehicles to cross over it. Continue to complete the survey form to the extent possible. Include information in Crossing Comments to explain your observations. For instance, indicate if an old culvert pipe is seen at the site, or if removal of the previous crossing structure left the stream with problems for aquatic organism passage.

Buried Stream: The planned crossing site does not include an inlet and/or outlet, likely because a stream previously in this location has been rerouted, probably underground. In this case, survey is not possible, and no further data is required.

Inaccessible: Survey is not possible because roads or trails to the crossing are not accessible. This may be due to private property posting, gates, poor condition, or other factors. Record in Crossing Comments why the site is inaccessible. No further data is required.

Partially Inaccessible: Use this option when you can access a crossing well enough to collect some but not all required data. This is most likely to occur when you cannot access either the inlet or outlet side of a crossing and cannot reasonably estimate the dimensions or assess things like inlet grade, outlet grade, scour pool or tailwater armoring.

No Upstream Channel: This option is for places where water crosses a road through a culvert but no road-stream crossing occurs because there is no channel up-gradient of the road. This can occur at the very headwaters of a stream or where a road crosses a wetland that lacks a stream channel (at least on the up-gradient side).

Bridge Adequate: Coordinators have the option of using this classification for large bridges for which it is obvious that they present no barrier to aquatic organism passage. Observers may collect and enter data for these crossings but these data are not required.

Number of Culverts/Bridge Cells: For all Bridges with multiple sections or cells, and for all multiple culverts, you must enter the number of those cells or culvert structures here.

Photo IDs: All surveys should include a minimum of four digital photos of the following: crossing inlet, crossing outlet, stream channel upstream of crossing, and stream channel downstream of crossing. These photos are immensely useful in setting priorities for restoration. <u>Note that photos of buried streams are optional but recommended</u>.

It is essential that all photos be associated with the correct crossing. If you take photos with a digital camera (and sometimes when using a smart phone or tablet computer), you should record the photo numbers assigned by the camera on the survey form in the space for each photo perspective. To record the correct photo numbers from any camera, each person taking photos must be familiar with the numbering system of the camera used. Record the ID number of each photo in the blanks on the data form.

While you may take multiple photos at a site in order to choose the best ones later, you must record on the data form the ID numbers of all photos taken at the site. It can be very helpful to have one or more additional photos, especially when important characteristics are not captured on the four required photos. For instance, if there is extreme erosion at the site, or if other aspects of the crossing make it a likely barrier to connectivity, it is useful to capture these with one or two additional photos.

A simple way to know which photos were taken at a particular site is to use a black marker on a white dry-erase board to record the date and Crossing Code, and to have the first photo at the crossing show this white board displaying the date and Crossing Code. The white board should be strategically placed in the photo so that it is legible and does not block key features of the crossings. This will make the photo readily identifiable with the appropriate crossing. Some people have noted that white dry-erase boards and white paper reflect so much light that they are often "washed out" in the photos, making the codes written on the board impossible to read; use of a small blackboard and chalk may be preferable depending on light conditions.

Here are several additional tips for taking useful photos:

- Always include more than just the structure or stream area you are photographing; it is better to capture more context. Remember that with digital photos, we can zoom in to see detail.
- Including a stadia rod in photos of the inlet and outlet can be valuable to verify some measurements, and as a general reference for scale.
- When available, use a date/time stamp to code each photo.
- Set your camera to record in low to medium resolution so that the photos do not take up too much space on the memory card and when downloaded for storage. To minimize storage space but still allow a reasonable quality image, each photo should be between 100 and 500 kilobytes in size when downloaded. This often equates to a camera resolution setting of "1 Megapixel."
- Review photos at the site to discard bad photos and to be sure all perspectives are well represented.
- If you haven't used the camera before, practice to be sure you know how to take photos in dark or mixed light situations, as these often exist when surveying stream crossings.

The following are some examples of useful photos:

	Site 1	**Site2**	**Site 3**
Inlet			
Outlet			

Upstream

Downstream

Flow Condition: Check the appropriate box to indicate how much water is flowing in the stream. Normally, the value selected for the first perennial crossing of the day will hold for all perennial sites in the area during that day, unless a rainfall event changes the situation. Choose only one option.

No Flow: No water is flowing in the natural stream channel; this option is typical of extreme droughts for perennial streams, or frequent conditions for intermittent or ephemeral streams.

Typical-Low: This is the most commonly used and expected value for surveys conducted during summer low flows, particularly on perennial streams. Water level in the stream will typically be below the level of non-aquatic vegetation, exposing portions of stream banks and bottom.

Moderate: This value is selected when recent rains have raised water levels at or above the level of herbaceous (non-woody) stream bank vegetation.

High: This value is selected only rarely, when flows are very high relative to stream banks, making crossing surveys very difficult or impossible, normally due to very recent, or ongoing major rain events. Avoid surveying crossings under high flows as data will not reflect more frequent flow conditions.

Crossing Condition: Check one box that best summarizes the condition of the crossing, based on your observations of the overall state or quality of the crossing, including all structures, particularly the largest or those carrying most of the flow. We are primarily trying to identify crossings in immediate danger of failing or in imminent need of replacement, as well as those that have been very recently installed. Focus primarily on the condition of structure materials.

OK: This is the value given to the vast majority of crossings. Many crossings have deficiencies such as surface rust, dents, dings, or cracks which do not indicate risk of failure.

Poor: This value is intended for structures where the material appears to be failing, such as metal culverts with rot (not just surface rust), or concrete, stone or wooden structures that are already collapsing, or in danger of immediate failure (see images below as examples).

New: This value is assigned only to a crossing that has been installed very recently. Look for unblemished structures with new riprap and/or vegetative bank stabilization.

Unknown: This value applies to all sites where the condition of the crossing cannot be assessed, such as when submerged.

Tidal Site: Sites in tidal areas will often require additional survey to fully assess aquatic organism passage. This element is primarily meant to identify sites in a tidal zone. Choose only one option. Survey of tidal crossings is best done within one hour of low tide to improve access and provide the most useful data. Freshwater streams influenced by tides, often at great distances from the ocean, are more difficult to identify. Coordinators working in such areas should provide Lead Observers with guidance on survey of such sites.

Yes: Evidence shows that tidal waters regularly reach the crossing site. Evidence includes a clear wrack line (line of debris) marking the limit of recent tides. Other indications include observation of salt marsh plants (*spartina spp.*, not upland vegetation or freshwater wetland plants like cattails and common reed (*phragmites*), though both of these wetland plants *can* exist on the fringes of salt marshes) in the vicinity.

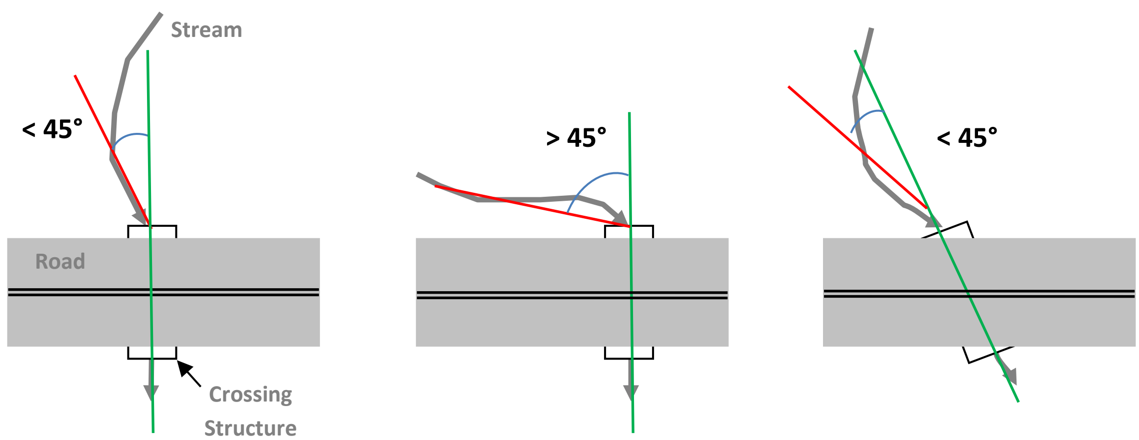
No: Sites are not tidal if downstream banks obviously contain plants that could not survive salt water inundation, such as alders, maples, ferns, etc., normally seen on stream banks in upland areas.

Unknown: Select when unsure of whether a crossing is in a tidal zone.

Alignment: Indicates the alignment of the crossing structure(s) relative to the stream at the inlet(s). Compare the crossing centerline (green lines below) to a centerline of the stream where it enters the crossing (red lines below).

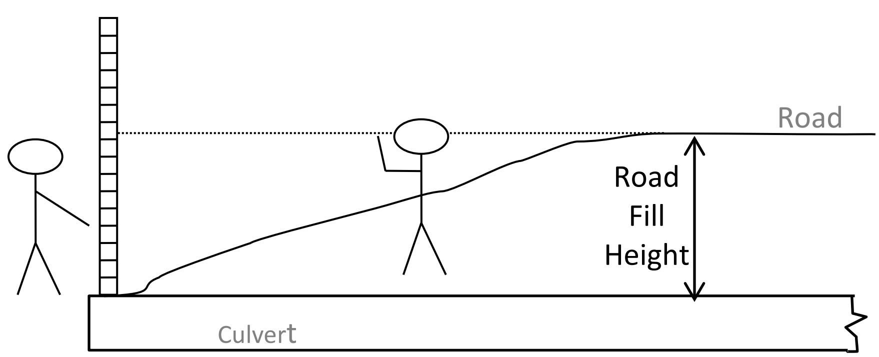
Flow-Aligned: The stream approaches the crossing at less than a 45 degree angle from the centerline.

Skewed: The stream approaches the crossing structure(s) at an angle greater than 45 degrees from the centerline. Note that for some crossings the centerline is not perpendicular to the road.



Flow-Aligned **Skewed** **Flow-Aligned**

Road Fill Height: Within 1 foot, measure the height of fill material between the top of the crossing structure(s) and the road surface. This is best measured with two people when the road surface or fill height is above a surveyor's height, with one person holding a stadia rod, and the other sighting the elevation of the road surface from the side (see diagram below). For multiple culverts with differing amounts of fill over them, provide an average fill height.



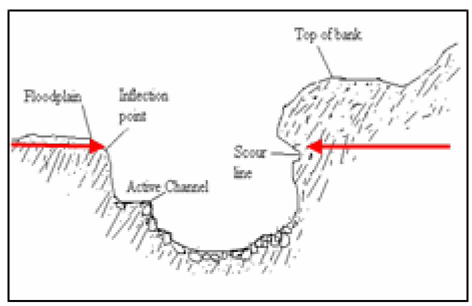
Bankfull Width (optional measurement)**:** This is a measure of the active stream channel width at bankfull flow, the point at which water completely fills the stream channel and where additional water would overflow into the floodplain. Estimates of the frequency of bankfull flows vary, but they may happen as often as twice a year, or only once every one or two years. Each state or regional coordinator will define whether or not you should measure bankfull width in your surveys. When done with high confidence (see next metric), bankfull width can be an extremely useful measurement, but it can be difficult and time consuming, and it will not be possible for all surveyors and sites (even with experienced surveyors). The first step is to identify bankfull flow indicators in an undisturbed reach, and the second step is to measure the width from bank to bank at those locations. Indicators of bankfull flow (shown in the photographs below as the red line) include[1]:

Abrupt transition from bank to floodplain: The point of change from a vertical bank to a more horizontal surface is the best identifier of bankfull stage, especially in low-gradient meandering streams.



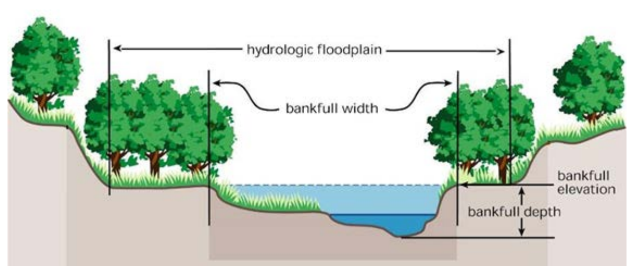
Top of point bars: The point bar consists of channel material deposited on the inside of meander bends. Set the top elevation of point bars as the lowest possible bankfull.

Bank undercuts: Maximum heights of bank undercuts are useful indicators of bankfull flow in steep channels lacking floodplains.



Changes in bank material: Changes in the particle size of sediment (rocks, soil, etc.) may indicate the upper limits of bankfull flows, with larger sediments exposed to more frequent channel-forming flows.

Change in vegetation: Look for the low limit of woody vegetation, especially trees, on the bank, or a sharp break in the density or type of vegetation.



[1] Adapted from Georgia Adopt-A-Stream "Visual Stream Survey" manual. Georgia Department of Natural Resources, 2002.

Bankfull Width Confidence: This qualifies your assessment of Bankfull Width based on your experience with its measurement and whether sufficient criteria were met in your measurements. Choose only one option.

High: Select this option only when you are highly confident that your assessment of Bankfull Width meets the following criteria:

- Clear indicators are present to define the limits of Bankfull Width.
- The recorded value is an average of at least three measurements in different locations.
- All measurements of Bankfull Width were taken in undisturbed locations well upstream or downstream of the crossing.
- No tributaries enter between the crossing and your area(s) of measurements.
- No measures taken at stream bends, pools, braided channels, or close to stream obstructions.

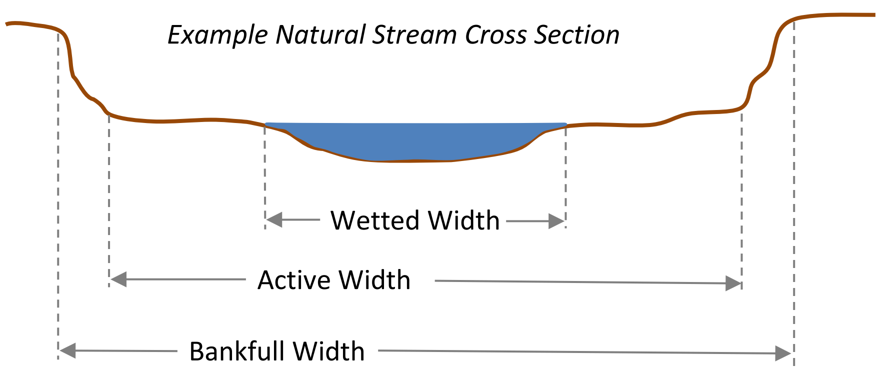
Low/Estimated: Select this when **any** of the above criteria cannot be met.

Constriction: Regardless of whether you measured Bankfull Width above, this element assesses how the width of the crossing (including all of its structures) compares to the width of the natural stream channel. Refer to the above section on determining Bankfull Width for reference. Two other ways of assessing the width of the natural stream channel consider the *active channel* and the *wetted channel*.

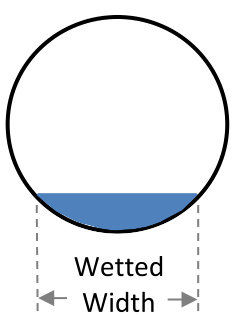
The *active channel* is the area of the stream that is very frequently affected by flowing water. The width of the *active channel* can often be very close to the Bankfull Width when stream banks are very steep. The *wetted channel* is simply the area of the stream that contains water at the time of survey, which may be significantly less than the *active channel*, depending on flow.

Refer to the general illustrations below, and check the appropriate description from the list below to assess how constricted the flow of the stream is by the crossing compared to either the *bankfull*, *active*, or *wetted* channel. Choose only one option.

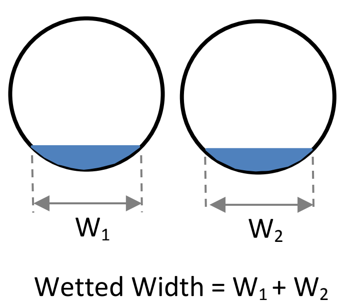
Example Natural Stream Cross Section



Example Culvert Cross Section



Example Multiple Culvert Cross Section



Severe: The total width of the crossing (sum of widths of all crossing structures) is less than 50% of the bankfull or active width of the natural stream, or the total *wetted width* of the crossing is less than 50% of the wetted width of the stream.

Moderate: The crossing is *greater than* 50% of the bankfull or active width of the natural stream, but less than the full bankfull or active channel width.

Spans Only Bankfull/Active Channel: The crossing encompasses the approximate width of the bankfull or active channel.

Spans Full Channel & Banks: The crossing completely spans beyond the *Bankfull Width* of the natural stream, as often evidenced by banks within the crossing structure.

Tailwater Scour Pool: This is a pool created downstream of a crossing as a result of high flows exiting the crossing. Use as a reference natural pools in a portion of the stream that is outside the influence of the crossing structure. A scour pool is considered to exist when its size (a combination of length, width, and depth) is larger than pools found in the natural stream. Check *Large* if the length, width **or** depth of the pool is two or more times larger than of pools in the natural stream channel. Otherwise, check *Small* if the pool is between one and two times the length, width, **or** depth of pools in the natural channel.

None: There is no difference between the length, width, or depth of the tailwater pool compared with reference pools, or no tailwater pool exists at the site.

Small: The tailwater pool is between one and two times the length, width, or depth of reference pools.

Large: The tailwater pool is more than twice the length, width or depth of reference pools.

Crossing Comments: Use this area for brief comments about any aspect of the overall crossing survey that warrants additional information. Do <u>not</u> use this box for comments about particular structures; comment boxes for each structure are provided elsewhere on the form.

STRUCTURE DATA

<u>Choose only one option</u> for structure data fields **except** when identifying Internal Structures and Physical Barriers.

When there are multiple culverts and/or bridge cells, number them from left to right, while looking downstream toward the culvert inlet. The left-most structure is Structure 1, and structure numbers increase to the right. See examples below.

For each structure, you will complete the following information.

Structure Material: Record here the primary material of which the structure is made, i.e., the material that makes up the majority of the structure. When in doubt, focus on the material that is most in contact with the stream. If a structure is made of two materials, such as a bridge with concrete abutments and a steel deck structure, a metal culvert that has been lined along its entire bottom with concrete, or a crossing with different types of structures at inlet and outlet, select *Combination*. <u>Choose only one option</u>.

Outlet Shape: Refer to the diagrams on the last page of the field data form, and record here the structure number that best matches the shape of the structure opening observed at the inlet of the culvert. This is usually simple, but when a shape seems unusual, you should carefully choose the most reasonable option from among the eight available. We collect this information to be able to find the "open area" inside the structure above any water or substrate, so the shape is vital to accurately calculate area. Choose only one option.

1 - Round Culvert: This is a circular pipe. It may or may not have substrate inside, even though the diagram on the field form shows a layer of substrate. It may be compressed slightly in one dimension, and should be considered round unless it is truly squashed so that it reflects a type 2 shape below.

2 - Pipe Arch/Elliptical Culvert: This is essentially a squashed round culvert, where the lower portion is flatter, and the upper portion is a semicircular arch, or as on the right below, more of a pure ellipse. It may or may not have substrate inside (the diagram on the field form shows a layer of substrate).

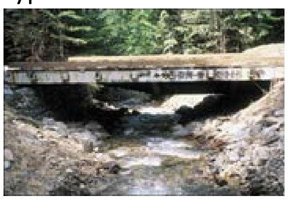
3 - Open Bottom Arch Bridge/Culvert: This structure will often look like a round culvert on the top half, but it will not have a bottom. There will be some sort of footings to stabilize it, either buried metal or concrete footings, or concrete footings that rise some height above the channel bottom. There will be natural substrate throughout the structure. To distinguish between an embedded Pipe Arch Culvert and an Open Bottom Arch, note that the sides of the Pipe Arch curve inward in their lower section, while the sides of the Open Bottom Arch will run straight downward into the streambed substrate or to a vertical footing. Beware of confusion between an Open Bottom Arch and an embedded Round Culvert; Open Bottom Arches tend to be larger than most Round Culverts. This shape could also be selected for certain bridges that have a similar arched shape and are not well represented by other bridge types (Types 5, 6, 7, below).

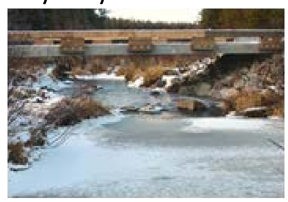
4 - Box Culvert: These structures are usually made of concrete or stone, but sometimes of corrugated metal with a slightly arched top. Typically, they have a top, two sides, and a bottom.

A box culvert without a bottom, called a bottomless box culvert, should be classified as a *Box/Bridge with Abutments* (#6, below). If you cannot tell if the structure has a bottom, classify it as a *Box/Bridge* *with Abutments* (#6). The images below show *Box Culverts* (#4).

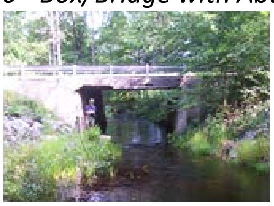



5 - Bridge with Side Slopes: This is a bridge with angled banks up to the bottom of the road deck. This type will have no obvious abutments, though they may be buried in the road fill.





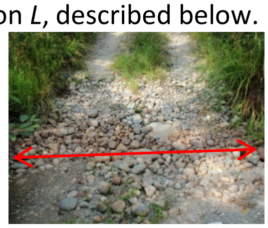

6 - Box/Bridge with Abutments: This is a bridge or bottomless box culvert with vertical sides.




7 - Bridge with Side Slopes and Abutments: This is a bridge with sloping banks and vertical abutments (typically short) that support the bridge deck. (Arrows below show the abutments.)




Ford: A ford is a shallow, open stream crossing that may have aminimal structure to stabilize where vehicles drive across the stream bottom. The arrows below indicate the length of a ford, to be measured as Dimension *L*, described below.

Unknown: Select when a structure's shape is unidentifiable for any reason. Typically, the inlet shape may be unidentifiable because it is submerged or completely blocked with debris.

Removed: Select when the structure is no longer present.

Outlet Armoring: Select from the options to indicate the presence and extent of material placed below the outlet for the purpose of diffusing flow and minimizing scour. The most common form of outlet armoring is a layer of riprap (angular rock) placed below the outlet. A few pieces of rock that may have fallen into the stream near the structure's outlet **do not** constitute outlet armoring. Armoring of the road embankment and stream banks should not be confused with armoring of the stream bottom at the outlet. Choose only one option.

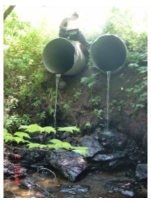
Refer to the photos below for examples of each option.

None: This situation represents the majority of crossing structures. You may observe rocks that have fallen from the embankment or that are natural to the stream. Most cascades do not constitute armoring unless specifically put in place to minimize outlet scour.





Not Extensive: There is of a layer of material covering an area *less than 50% of the stream width* placed purposefully below the outlet specifically to minimize the effects of scour.



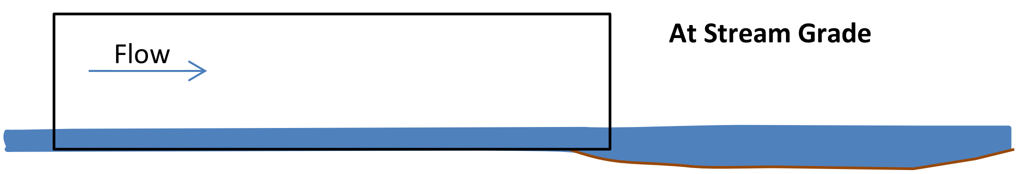


Extensive: Select this option only if you observe an extensive layer of material covering an area more than 50% of the stream width, which was put in place specifically to minimize scour at the outlet.



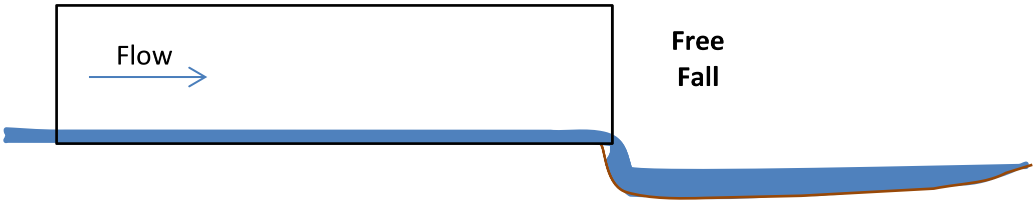

Outlet Grade: Outlet grade is an observation of the relative elevation of the structure to the streambed and how water flows as it exits the structure. This is not an assessment of stream slope (gradient).
<u>Choose only one option</u>.

At Stream Grade: The bottom of the outlet of the structure is at approximately the same elevation as the stream bottom (there may be a small drop from the inside surface of the structure down to the stream bottom), such that **<u>water does not drop downward at all</u>** when flowing out of the structure. Such outlets can normally be considered to be "backwatered" by the downstream stream bed.

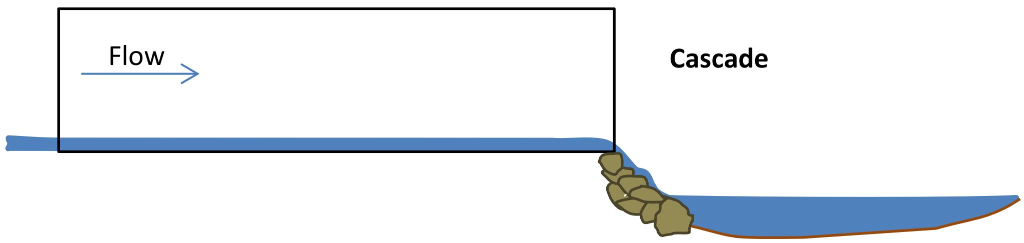




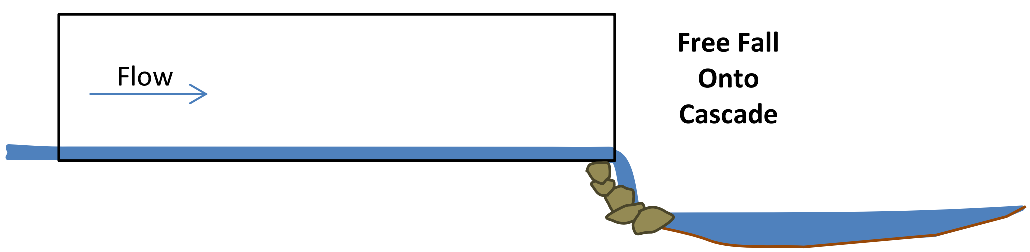

Free Fall: The outlet of the structure is above the stream bottom such that **<u>water drops vertically</u>** when flowing out of the structure.



Cascade: The outlet of the structure is raised above the stream bottom at the outlet such that **water flows very steeply downward across rock or other hard material** when flowing from the structure. Think of this as series of small waterfalls at the outlet.



Free Fall Onto Cascade: The outlet of the structure is raised above the stream bottom at the outlet such that **water drops vertically onto a steep area of rock or other hard material, then flows very steeply downward** until it reaches the stream.



Outlet Dimensions: **Four** measurements should be taken at the outlet and inside all structures, and an additional **two** should be taken for all structures with an Outlet Grade marked as *Free Fall, Cascade* or Free *Fall*

Onto Cascade. The four measurements are shown on the diagrams on the last page of the field data form, and the others are illustrated below.

Dimension A, ***Structure Width***: To the nearest tenth of a foot, measure the full width of the structure outlet according to the location of the horizontal arrows labeled ***A*** in the diagrams. Take this measurement **inside** the structure.

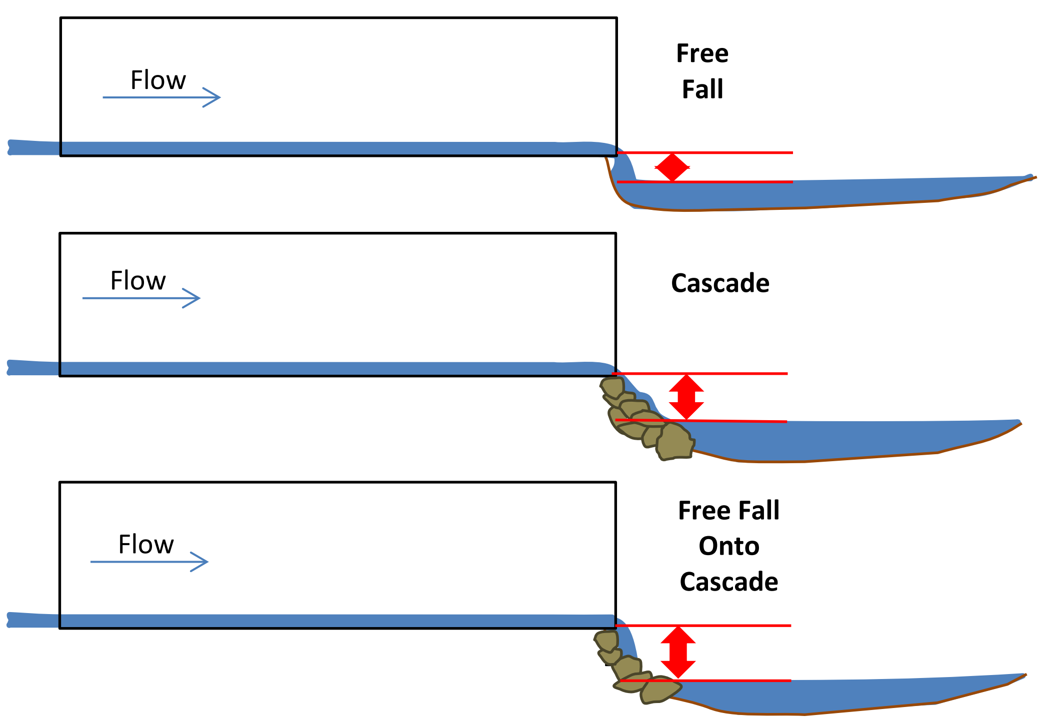
Dimension B, ***Structure Height***: To the nearest tenth of a foot, measure the height of the structure outlet according to the location of the vertical arrows labeled ***B*** in the diagrams. Take this measurement **inside** the structure. If there is no substrate inside, this will be the full height of a structure from bottom to top. If there is substrate inside, this will be the height from the top of the stream bottom substrate up to the inside top of the structure.

*Dimension C, **Substrate/Water Width***: To the nearest tenth of a foot, measure the width of **either** the substrate layer in the bottom of the structure, or of the water surface, whichever is **wider** according to the general location indicated by the arrows labeled ***C*** in the diagrams. This measurement must be taken **inside** the structure near the outlet. Some rules of thumb for Dimension C are below:

- When there is no substrate in a structure, measure only the width of the water surface.
- When there is no water in a structure, but there is substrate, measure the width of substrate.
- When there is no substrate or water in a structure, C = 0.

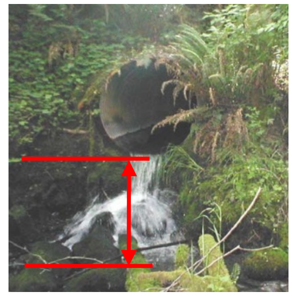
*Dimension D, **Water Depth***: To the nearest tenth of a foot (except when < 0.1 foot, to the nearest hundredth of a foot), measure the average depth of water in the structure at the outlet according to the location of the vertical arrows labeled ***D*** in the diagrams. This measurement must be taken **inside** the structure. When there are lots of different depths due to a very uneven bottom, take several measurements and record the average. For fords, measure the water depth at the downstream limit of the ford.

Outlet Drop to Water Surface: This measurement is only applicable to *Free Fall, Cascade* and Free *Fall Onto Cascade* outlets. To the nearest tenth of a foot, measure from the inside bottom surface of the structure (**not** the top of the water) down to the water surface outside the structure. For *Cascade* and *Free Fall Onto Cascade* structures, measure to the surface of the water at the bottom of the cascade. Refer to the diagrams and photos below for guidance; the red arrows indicate where to make this measurement. When assessing *At Stream* Grade structures or dry structures in streams without flow or water in an outlet pool, this measurement must be *zero*.



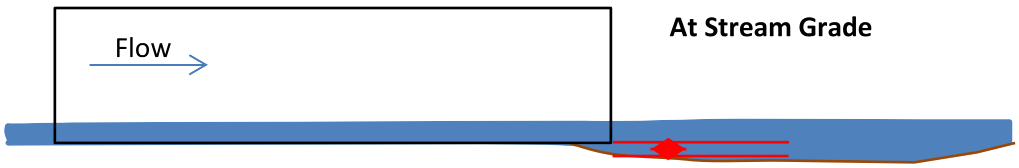
Free Fall

Free Fall

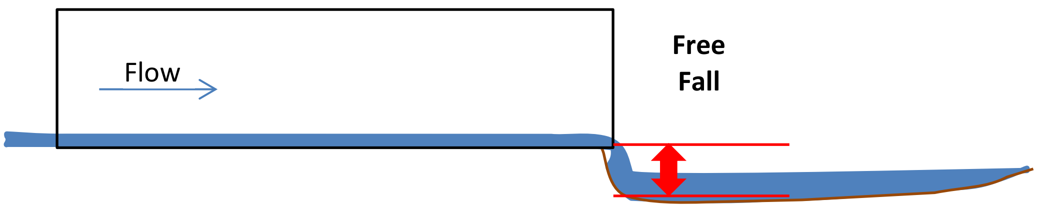


Free Fall Onto Cascade

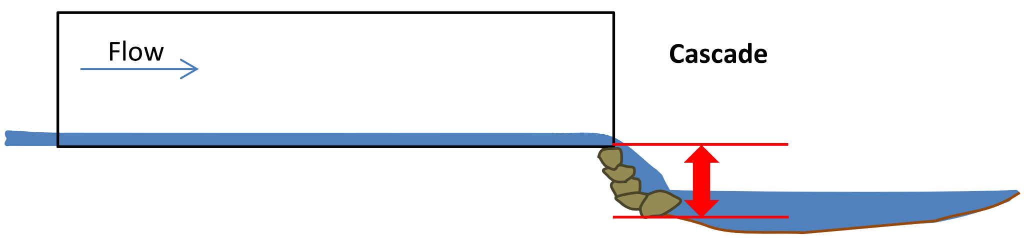
Outlet Drop to Stream Bottom: To the nearest tenth of a foot, measure from the inside bottom surface of the structure (**not** the top of the water) down to the stream bottom at the place where the water falls from the outlet. For *At Stream* Grade structures, this may be hard to measure, and may be a very small drop. For *Cascade* and *Free Fall Onto Cascade* structures, measure the full vertical drop to the stream bottom at the end of the cascade. Refer to the diagrams below for guidance.



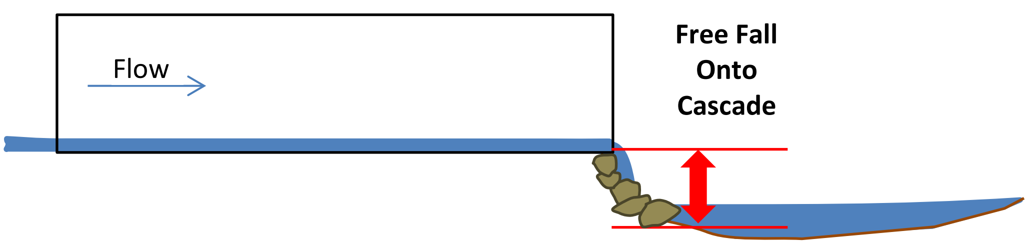
At Stream Grade



Free Fall



Cascade

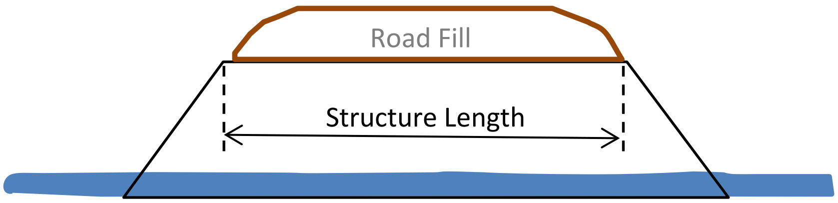


Free Fall Onto Cascade

Abutment Height, *Dimension E*: This measurement is taken only when surveying a *Bridge with Side Slopes and Abutments* (#7 structure**)**. To the nearest foot, measure the height of the vertical abutments from the top of the side slopes up to the bottom of the bridge deck structure.

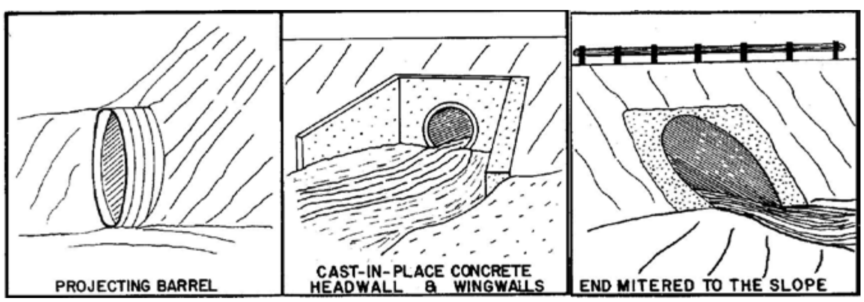



Structure Length, *Dimension L*: To the nearest foot, measure the length of the structure at its top.



Inlet Shape: Refer to the diagrams on the last page of the field data form, and record here the number that best matches the shape of the structure at its outlet. Refer to the instructions for **Outlet Shape** for examples and photos.

Inlet Type: Choose only one option for the style of a culvert inlet, which affects how water flows into the crossing, particularly at higher flows. The drawings here are meant as general guides, but refer to the photos below for more specific images of each type.



Projecting: The inlet of the culvert projects out from (is not flush with) the road embankment.




Headwall: The inlet is set flush in a vertical wall, often composed of concrete or stone.




Wingwalls: The inlet is set within angled walls meant to funnel water flow. These walls can be composed of the same material as the culvert, or different material. It is relatively rare to see wingwalls without a headwall.




Headwall & Wingwalls: The inlet is set flush in a vertical wall, and has angled walls to funnel flow.




Mitered to Slope: The inlet is angled to fit **flush with the slope of the road embankment**. Note that many mitered culverts project out from the embankment, and should be recorded as *Projecting*.



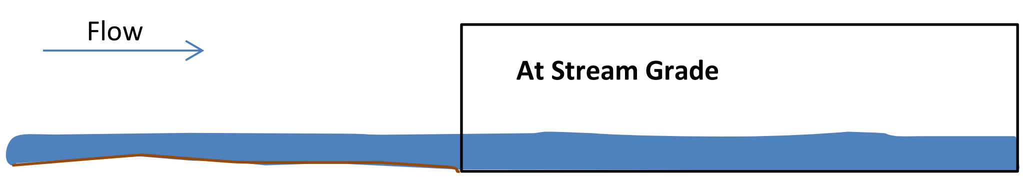

Other: There may be some other inlet characteristics that do not match any of the above types and which may limit flow into the culvert (but are not *Physical Barriers*), in which case select *Other*, and explain in *Structure Comments*.

None: The inlet does not have any of the above features or characteristics.

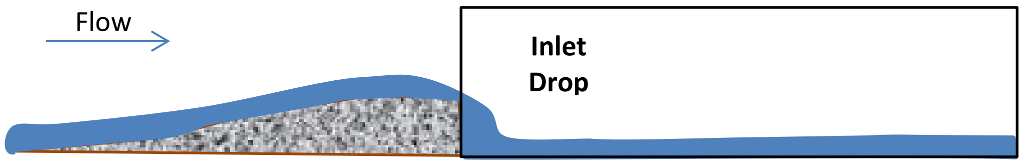



Inlet Grade: An observation of the relative elevation of the stream bottom as it enters the structure. This is not an assessment of stream slope (gradient). <u>Choose only one option</u>.

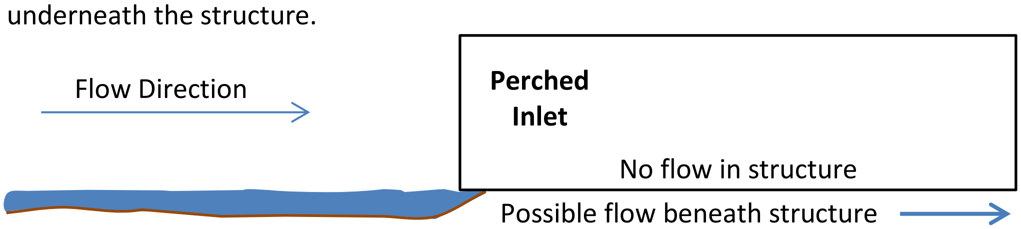
At Stream Grade: The inlet of the structure is at approximately the same elevation as the stream bottom upstream of the structure.



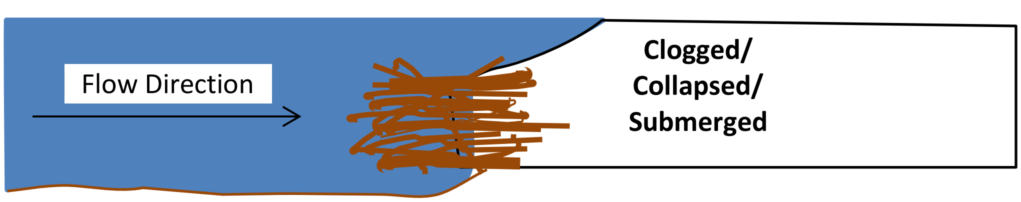
Inlet Drop: Water in the stream has a near-vertical drop from the stream channel down into the inlet of the structure. This usually occurs because sediment has accumulated above the inlet. The drop should be very obvious and not typical of natural drops in that stream. If there is a debris blockage or dam at the inlet, use **Physical** Barriers to record those features, and mark *At Stream Grade* here.



Perched: The inlet of the structure is set too high for the stream, and little water passes through the structure during normal low summer flows, though the stream has water upstream and downstream of the crossing. The structure inlet is above the surface of water in the stream. Water can enter the structure only at higher flows. This is a relatively rare condition, found mostly on very small streams. At such sites, there is generally water backed up above the inlet. In some cases water may be "piping" underneath the structure.



Clogged/Collapsed/Submerged: The structure inlet is either full of debris, collapsed, or completely underwater (not usually all three), making inlet measurements impossible. This may be found in places where beavers or debris have plugged a structure inlet so completely that water has backed up and covered the inlet, or where a crossing has collapsed to the point that it cannot be measured at its inlet.



Unknown: The inlet cannot be located or observed, or for some other reason you cannot determine the *Inlet Grade*, or take any inlet measurements.

Inlet Dimensions: There are four basic measurements to take at the inlet and outlet of each structure; these four measurements are to be made inside the structure. These are shown on the diagrams on the last page of the field data form.

Dimension A, ***Structure Width:*** To the nearest tenth of a foot, measure the full width of the structure inlet according to the location of the horizontal arrows labeled ***A*** in the diagrams. Take this measurement **inside** the structure.

Dimension B, ***Structure Height***: To the nearest tenth of a foot, measure the height of the structure inlet according to the location of the vertical arrows labeled ***B*** in the diagrams. Take this measurement **inside** the structure. This may be the full height of a culvert pipe if there is no substrate inside, or if there is substrate, it will be the height from the top surface of the substrate up to the inside top of the structure.

Dimension C, ***Substrate/Water Width***: To the nearest tenth of a foot, measure the width of **either** the substrate layer in the bottom of the structure, or the water surface, whichever is wider, according to the general location indicated by the arrows labeled ***C*** in the diagrams. Take this measurement **inside** the structure at the inlet. Some rules of thumb for Dimension C are below:

- When there is no substrate in a structure, measure the width of the water surface.
- When there is no water in a structure, but there is substrate, measure the width of substrate.
- When there is no substrate or water in a structure, C = 0.

Dimension D, ***Water Depth***: To the nearest tenth of a foot (except when < 0.1 foot, to the nearest *hundredth* of a foot), measure the average depth of water in the structure at the inlet according to the location of the vertical arrows labeled ***D*** in the diagrams. This measurement must be taken **inside** the structure. When there are many different water depths due to a very uneven structure bottom, take several measurements and record the average. For fords, measure the water depth at the upstream limit of the ford.

Slope %*:* (Optional) Calculate or estimate the percent slope of the crossing from inlet to outlet by using one of several optional methods described below. Note that this measurement or estimate can be important to calculating the hydraulic capacity of the crossing, and is difficult to measure accurately without the proper tools. In general, the ease and accuracy of these different methods relates directly to the cost of the tools needed, with the most easy-to-use and accurate measurement tools costing more.

1) The simplest accurate method for measuring slope is to use an accurate laser rangefinder/hypsometer with a slope function, and to measure from inlet to outlet at the same height in relation to each invert. For instance, a person with a known eye height of 5.0 feet sights from one end of a culvert by standing on top of the inlet to the 5.0 foot mark on a stadia rod on top of the outlet. You must take at least three measurements and average them, and be sure the instrument is set to read in percent, not degrees.
2) Another method for measuring slope is to use an auto level or other accurate survey instrument to measure the vertical difference between inlet and outlet invert elevations, then dividing this number by the length of the structure, and multiplying by 100.

3) The next best approach is to use a clinometer that measures slope to the nearest half percent, measuring from a fixed point above one invert (inlet or outlet) to the same height above the opposite invert such as described above under method 1. Many clinometers include both percent and degree scales; be sure to use the percent scale.
4) Another less accurate approach is to sight from a fixed elevation above the inlet invert with a hand level to a stadia rod at the outlet invert, to take the difference in height between the two points, divide by the structure length, and multiply by 100.

Slope Confidence: Rate the confidence you have in your slope measurement or estimate according to the criteria below:

High: Used method 1 above, taking multiple measurements and averaging them, or used method 2 above.

Low: Used methods 3 or 4 above, taking multiple measurements and averaging them.

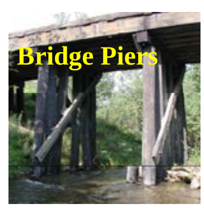
Internal Structures: Indicate the presence of structures inside the crossing structure. These may include baffles or weirs used to slow flow velocities and help to pass fish, as well as trusses, rods, piers or other structures intended to support a crossing structure, but which may interfere with flow and aquatic organism passage. See photos below for examples of internal structures. Choose any option(s) that apply.

None: There are no apparent structures inside the crossing structure.

Baffles/Weirs: Baffles (partial width) or weirs (full width, notched or not) are incorporated into the structure, either inside or at its outlet, to help aquatic organisms move through the structure.

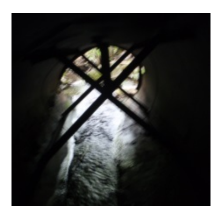
Supports: Some type of structural supports, such as bridge piers, vertical or horizontal beams, or rods apparently meant to support the structure, are observed inside the crossing structure.

Other: Structure(s) other than the categories above are present inside the crossing structure. Provide a very brief description of those structures here, or more fully describe them under **Structure Comments**. <u>**Do not**</u> include here items such as bedrock, material blockages, structural deformation, or inlet fencing to exclude beavers, which will be recorded below as **Physical Barriers**.









Structure Substrate Matches Stream*:* <u>Choose only one option</u> based on a comparison of the substrate (e.g., rock, gravel, sand) inside the structure and the substrate in the natural, undisturbed stream channel.

None: Select this option when there is very little (e.g., a thin layer of silt or a few pieces of rock) or no substrate inside the structure.

Comparable: The substrate inside the structure is similar in size to the substrate in the natural stream channel.

Contrasting: The substrate inside the structure is different in size from the substrate in the natural channel.

Not Appropriate: The substrate inside the structure is very different in size (usually much larger) than the substrate in the natural stream channel. Imagine turtles that typically move along a sandy stream trying to traverse an area of large cobbles, angular riprap or boulders (rarely observed).

Unknown: There is no way to observe if there is substrate inside the structure or what type it is. Select this option when deep, fast, or dark water or other factors do not allow direct observation.

Structure Substrate Type: Choose only one option from the table below to indicate the most common or dominant substrate type inside the structure. If you are certain that the structure contains substrate, but cannot assess the type, select *Unknown*. If there is no substrate in the structure, select *None*.

Substrate Type	Feet	Approximate Relative Size
Silt	< 0.002	Finer than salt
Sand	0.002 – 0.01	Salt to peppercorn
Gravel	0.01 – 0.2	Peppercorn to tennis ball
Cobble	0.2 – 0.8	Tennis ball to basketball
Boulder	> 0.8	Bigger than a basketball
Bedrock	Unmeasurable	Unknown - buried

Structure Substrate Coverage: Choose one option, based on the extent of the substrate inside the crossing structure as a ***continuous*** layer across the entire bottom of the structure from bank to bank (side to side).

None: Substrate covers less than 25% of the length of the structure, or there is no substrate inside the structure at all.

25%: Substrate covers *at least* 25% of the length of the structure.

50%: Substrate covers *at least* 50% of the length of the structure.

75%: Substrate covers *at least* 75% of the length of the structure.

100%: Substrate forms a ***continuous*** layer throughout the ***entire*** structure.

Unknown: It is not possible to directly observe whether substrate forms a continuous layer on the structure bottom.

Physical Barriers: Select any of these barrier types in or associated with the structure you are surveying, but do not include here information already captured in **Outlet Grade**. Note here additional barriers, including those associated with Inlet Grade or blockages, or Internal Structures. If a barrier feature affects more than one structure at a crossing (e.g., a beaver dam), include it for all affected structures. Refer to the photos below for examples of physical barriers.

Note that some structures have a combination of physical barriers. Check all that apply.

None: There are no physical barriers associated with this structure aside from any already noted in **Outlet Grade**.

Debris/Sediment/Rock: Woody debris or synthetic material, rock, or sediment blocks the flow of water into or through the structure. This can consist of wood or other vegetation, trash, sand, gravel, or rock. Do not check this option if you observe only very small amounts of debris that are likely to be washed away during the next rain event. Also, do not confuse sediment inside a structure that constitutes an appropriate stream bed with an accumulation that limits flow or passage of organisms.





Deformation: The structure is deformed in such a way that it significantly limits flow or inhibits the passage of aquatic organisms. This does not include minor dents and slightly misshapen structures.



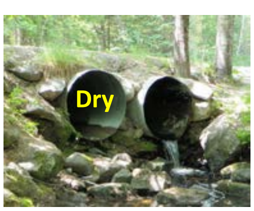

Free Fall: In addition to its **Outlet Grade**, which may include a *Free Fall*, the structure has one or more **additional** vertical drops associated with it. These may include a dam at the inlet, a vertical drop over bedrock inside the structure, or some other feature likely to inhibit passage of aquatic organisms. Note that a *Free Fall* inside a structure is often more limiting than similar size drops found in an undisturbed natural reach of the same stream which occur where there may be multiple paths for organisms to follow. A *Free Fall* can exist because of a debris blockage, so both physical barriers would be recorded.




Fencing: The structure has some sort of fencing, often at the inlet to deter beavers. Depending on the mesh size of that fencing, it may directly block the movement of aquatic and terrestrial organisms, and it may become clogged with debris. If also blocked with debris, be sure to check *Debris/Sediment/Rock* as a **Physical Barrier** type as well.




Dry: There is no water in this structure, though water is flowing in the stream. Note that if you recorded *No Flow* for crossing Flow Condition, you should not select *Dry* here, as we expect a dry structure at a dry crossing; it is not in itself a physical barrier. This barrier type helps to identify passage problems associated with overflow or secondary crossing structures.



Other: There may be different situations that do not fit clearly into one of the above categories, but may still represent significant physical barriers to aquatic organism passage. Use this option to capture such situations, and add information in Structure Comments. Below are examples of some unusual physical barriers which may not fit under Physical Barrier categories listed above.

These are examples of structures with a combination of physical barriers. Multiple relevant barrier types should be selected.





Severity: <u>Choose only one option for each surveyed structure</u>, and rank the severity based on an assessment of *the cumulative effect of all physical barriers affecting that structure* according to the table that follows. <u>Do not</u> consider information already captured in **Outlet Grade**. Decide on an overall severity for each structure by considering all the different Physical Barriers present. If any barrier affects more than one structure at a crossing, it should be included in the severity rating for each structure affected. Refer to the table below for guidance in choosing the **Severity** rating.

Physical Barrier	Severity	Severity Definition
None	*None*	No physical barriers exist - **apart from** Outlet Grade
Debris/Sediment/Rock *Logs, branches, leaves, silt, sand, gravel, rock*	*None*	None beyond few leaves or twigs as may occur in stream
	Minor	< 10% of the open area of the structure is blocked
	Moderate	10% - 50% of open area blocked
	Severe	> 50% of open area of structure blocked
Deformation *Significant dents, crushed metal, collapsing structures*	*None*	Small dents and cracks – insignificant effect on flow
	Minor	Flow is limited < 10%
	Moderate	Flow is limited between 10% - 50%
	Severe	Flow is limited > 50%
Free Fall *Vertical or near-vertical drop*	*None*	No vertical drop exists - **apart from** Outlet Grade
	Minor	0.1 - 0.3 foot vertical drop - **apart from** Outlet Grade
	Moderate	0.3 - 0.5 foot vertical drop - **apart from** Outlet Grade
	Severe	> 0.5 foot vertical drop - **apart from** Outlet Grade
Fencing *Wire, metal grating, wood*	*None*	No fencing exists in any part of the structure
	Minor	Widely spaced wires or grating with > 0.5 foot (6 inch) gaps
	Moderate	Wires or grating with 0.2 - 0.5 foot (~ 2-6 inches)spacing
	Severe	Wires or grating with < 0.2 foot (~ 2 inch) spacing
Dry	*Minor*	May be passable at somewhat higher flows
	Moderate	Not likely passable at higher flows
	Severe	Impassable at higher flows
Other	*Minor*	Use best judgment based on above standards
	Moderate	Use best judgment based on above standards
	Severe	Use best judgment based on above standards

Water Depth Matches Stream: Compare the water depth inside the structure with the water depth in the natural stream channel away from the influence of the crossing. Choose only one option.

Yes: The depth in the crossing falls within the range of depths naturally occurring in that reach of the stream and **for comparable distances** along the length of the stream. For example, if a structure has a water depth of 0.2 feet through the entire structure's length of 60 feet, and there comparable sections of the stream with a 0.2 foot water depth for approximately 60 feet of the channel, select *Yes*.

No-Shallower: This means that the water depth in the crossing is less than depths that occur naturally in a similar length of the undisturbed stream, or the shallower depth through the structure covers a greater length than occurs in the natural stream.

No-Deeper: This means that the water depth in the crossing is greater than depths that occur naturally in a similar length of the undisturbed stream. This is rarely observed.

Unknown: A comparison of structure depth to natural stream depth is not possible.

Water Velocity Matches Stream: Compare the water velocity inside the structure with the velocity in the natural stream channel away from the influence of the crossing. Choose only one option.

Yes: The water velocity in the crossing falls within the range of velocities naturally occurring in that reach of the stream **for comparable distances**. If velocities in the crossing are observed in the natural stream channel, and those velocities persist over the same distance as the structure length, select *Yes.*

No-Faster: This means that the water velocity in the structure is greater than velocities that occur naturally in a similar length of the undisturbed stream, or the velocity through the structure persists over a longer distance than occurs in the natural stream.

No-Slower: This means that the velocity in the crossing is less than velocities that occur naturally in a similar length of the undisturbed stream. This is rarely observed.

Unknown: A comparison of structure velocity to natural stream velocity is not possible.

Dry Passage Through Structure? Consider this question two different ways, depending on whether water is flowing through the structure. Choose only one option.

If there is water flowing in the structure: Is there a continuous dry stream bank through at least one side of the structure that allows the safe movement of terrestrial or semi-aquatic animals, and does this dry pathway connect to the stream banks upstream and downstream of the structure?

If there is no water flowing in the structure: then there is continuous dry passage through the structure.

Yes: A continuous bank connects upstream, through the structure, and downstream, or there is otherwise continuous dry passage through the structure.

No: There is no dry passage, the dry passage is not continuous, or the dry passage through the structure does not connect with stream banks upstream or downstream.

Unknown: It is not possible to determine if continuous dry passage exists through this structure.

Height Above Dry Passage: If there is dry passage through the structure, measure the average height from the dry stream bank to the top of the structure directly above (i.e., the clearance) to the nearest tenth of a foot. If both stream banks are dry and connected, record the higher measurement. If the structure has no water flow, measure the average height above the bottom of the structure or dry stream bed to the top of the structure.

Comments: Use this area to briefly comment on any aspects of the structure needing more information. Enter comments about the overall crossing in the **Crossing Comments** box.

Glossary of Terms

Aquatic organism – An aquatic organism lives in water for at least a portion of their life.

Bankfull– Bankfull is an established height at a given location along a river or stream, above which a rise in water surface will cause the river or stream to overflow the lowest natural stream bank somewhere in the corresponding reach.

Bankfull discharge – Bankfull discharge is the dominant channel forming flow with a recurrence interval seldom outside the 1 to 2-year range.

Bankfull width- The wetted width of the stream occurring at Bankfull.

Clear Span-The maximum inside width of a non-circular pipe or bridge. Cover height - The amount of fill material above a road stream crossing structure.

Design Load- The sum of all vertical forces (i.e. soil weight, passing vehicles, etc.) applied to a buried culverts or bridge.

Flood resiliency – Flood resiliency is the ability for the Town to withstand and recover from flood crisis.

Freeboard - The distance between normal water level and the bottom of the road stream crossing structure.

Geomorphic –Response of river and stream channels to various types of natural and human-caused disturbances including floods.

Head cut - A head cut in stream geomorphology, is an area of instream instability and erosional feature of streams with an abrupt vertical drop that can be perpetuated through the river system until equilibrium of channel dimensions and slope is attained.

Hydraulic capacity - The amount of water that can pass through a structure or watercourse.

Intermittent stream – An intermittent stream is a stream which normally ceases to flow for weeks or months each year.

Perennial stream – A perennial stream is a stream or river (channel) that has continuous flow in parts of its stream bed all year round during years of normal rainfall.

Recurrence Interval - Statistical techniques, through a process called frequency analysis, are used to estimate the probability of the occurrence of a given precipitation event. The recurrence interval is based on the probability that the given event will be equaled to or exceeded in any given year. Ten or more years of data are required to perform a frequency analysis for the determination of recurrence intervals. Of course, the more years of historical data the better—a hydrologist will have more confidence on an analysis of a river with 30 years of record than one based on 10 years of record.[1]

[1] https://water.usgs.gov/edu/100yearflood.html

Recurrence Intervals and Probabilities of Occurrences

Recurrence interval, in years	Probability of occurrence in any given year	Percent chance of occurrence in any given year
100	1 in 100	1
50	1 in 50	2
25	1 in 25	4
10	1 in 10	10
5	1 in 5	20
2	1 in 2	50

Regional regression – Regional regression equations are based on statistical relations between (1) streamflow statistics of interest computed from applicable records of the stations and (2) basin and climatic characteristics, for which data are typically readily available.

Road Stream Crossing – Road stream crossings are location where a road, paved or unpaved, crosses over a body of water within the physical extents of all supporting infrastructure (i.e. the proposed crossing infrastructure, wingwalls, etc.)

StreamStats - StreamStats is a USGS Web application that queries an assortment of Geographic Information Systems (GIS) analytical tools to calculate peak discharges for certain recurrence intervals. The calculations were established from publicly available US Geological Service research (USGS SIR 2006-5112 "Magnitude and Frequency of Floods in New York") which established a relationship between watershed characteristics and peak discharges. StreamStats also is a USGS web application hat calculates bankfull dimensions from publicly available US Geological Service research (USGS SIR 2009-5144 "Bankfull Discharge and Channel Characteristics of Streams in New York State") which established a relationship between watershed characteristics and bankfull dimensions.

Stormwater - Stormwater is water that originates during precipitation events and snow/ice melt that either soak into the soil (infiltrate), evaporates, or runs off and ends up in nearby streams, rivers, or other water bodies.

Wetland - A wetland is a distinct ecosystem that is inundated by water, either permanently or seasonally, where oxygen- free processes prevail.

NEW YORK STATE OF OPPORTUNITY. | Hudson River Estuary Program

AQUATIC CONNECTIVITY

Identifying Barriers to Organisms and Hazards to Communities

Problem Road Culverts

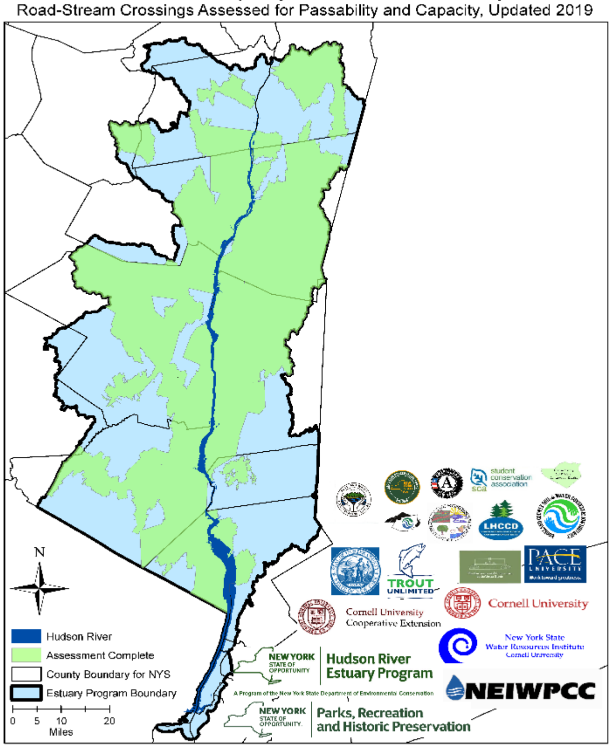
Poorly designed and undersized culverts are barriers to aquatic organisms and hazards to communities during storms. Streams are linear habitats for aquatic and semi-aquatic species such as American eel, herring, stream salamanders, turtles and crayfish. Road crossings can fragment streams into small pieces, preventing organisms from accessing critical habitats.

Culverts also may be infrastructure liabilities and flooding hazards for communities. During storms, undersized or improperly installed culverts can become clogged with debris or overwhelmed, leading to road flooding, stream bank erosion, or even washout of the whole road.

Culverts such as this these can constrict the natural flow of the stream, have a perched outlet that only strong swimmers can jump and contain no natural streambed. Many culverts and dams fragment

Municipalities can receive help prioritizing culverts that could be upgraded, benefitting aquatic organisms and communities' bottom lines.

Hudson River Estuary Program Culvert Prioritization Project
Road-Stream Crossings Assessed for Passability and Capacity, Updated 2019



Studies have found that about two-thirds of crossings are not fully passable to aquatic organisms. The NYSDEC Hudson River Estuary Program, other NYSDEC branches, Soil and Water Conservation Districts, and interested county and local partners are working to reconnect tributaries within the Estuary watershed by surveying and prioritizing impassable and undersized culverts. Road crossings with unnatural stream bottoms, a perched outlet where a culvert adds an unnatural step to the stream, or other conditions are often barriers to organisms that need to go up and down streams.

Cornell University hydrologists model each crossing for the maximum storm interval (return period) the crossing could pass without spilling over the road. Undersized culverts are more likely to flood the road and washout during large storms. Emergency replacement of failed culverts costs more money and disrupts essential services such as hospital access during flood events. **This project connects interested communities with funding sources to replace impassable, undersized culverts with fully passable, properly sized culverts.**

Empowering Communities

After the assessment work, communities have data on each crossing's passability and capacity scoring information. This data is also available on the Cornell WRI Aquatic Connectivity Map and the North Atlantic Aquatic Connectivity Collaborative database. Estuary Program staff are available for technical assistance and presentations to help communities use the information. Culvert assessments have been conducted in approximately 54.4% of the Hudson River Estuary Program boundary with the help of many partners.

Scenic Hudson Land Trust received a grant to improve the aquatic organism passability and reduce the flooding hazard of this vital piece of infrastructure.

To help communities reconnect their streams and proactively remove flooding hazards, Estuary Program grants can fund these planning and mitigation steps.

1.) **Assess Culverts and Bridges** for aquatic organism passability and storm capacity by partner organizations or Estuary Program staff.

2.) **Prioritize Problem Culverts** within a management plan. After the crossings have been assessed and modeled, municipalities can rank crossings by passability, capacity and local needs. This document can be added to a Natural Resource Inventory or Hazard Mitigation Plan.

3.) **Design Replacements** through conceptual or shovel-ready engineering plans. This process also addresses relevant permits required for a construction mitigation project.

4.) **Fix Problem Culverts** by upgrading infrastructure to be fully passable to organisms and reduce flooding hazards.

Removing harmful and unnecessary stream barriers will benefit our resident and migratory fish, as well as all the other organisms that use our streams. New York has seen a dramatic increase in the amount of rain falling during large storms, and climate change projections suggest that will continue. Planning for fully passable crossings for organisms also means planning for structures capable of handling more frequent and intense storm events. This project gives communities a clear understanding of where problem stream barriers are and provides funding to fix them.

CONTACT INFORMATION

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KEY POINTS

Partners have assessed over 10,000 crossings

- 20% of these are substantial barriers to aquatic organisms
- 71% of crossings are undersized
- Problems are more pronounced for locally owned roads

D. Checklist for Municipalities Preparing for Funding Opportunities

Checklist for municipalities preparing for funding opportunities

Info needed for applications to help answer questions such as: Is the project ready to go? Will it have a meaningful impact on the identified problem? Are the costs necessary and logical?

Culvert ID:

Location map included/attached? ☐
Pictures included/attached? ☐

Funding Source(s) sought:

	Topics	Town Answers/Notes
General	Municipality	
	Primary contact person(s)	
	Watershed management plans? (local or regional)	
Culvert/Road-specific	Road crossing/ location description **NAACC**	
	Who owns the road/crossing? *(Does the municipality have permission to work there?)*	
	Owners upstream/downstream? **Parcel Mapper**	
	GPS coordinates **NAACC**	
	NAACC score	
	Current structural condition **Local records, NAACC**	
	When was this culvert replaced/ installed? **Local**	
	Recorded damages to road and/or structure over past 25 years **Local**	
	Flooding history **Local, any disaster declarations?**	
	Community/municipality primarily served by the crossing **Local**	
	Data on traffic density available or needed? **Highway dept.?**	

Stream	Tributary/stream name (if any)	
	State Stream classification **Hudson Valley Natural Resource Mapper**	
	Name of HUC 12 watershed **HVNR Mapper**	
Flooding	RP (Return Period) *[statistical year flood this structure can pass, e.g. 100-year flood]* **WRI**	
	Is the location in a FEMA floodplain? **Columbia County Parcel Mapper**	
	Future flooding model from 2050? **WRI**	
Ecological	Located in important area for rare plants or animals? (Eel – current or historic?) **HVNR mapper, Local**	
	Located within significant natural community? **HVNR mapper**	
	Water quality: Is this an impaired stream? High Quality? **Stream Condition Index**	
	Local land use, zoned uses **Local**	
	Where does this location's watershed fall in regards to HREP priority streams? (Rated 1 thru 20) **NAACC website (not on database): NAACC Watershed Prioritization map**	
	State Stream Standard *(Is this a trout stream/spawning stream?)* **HVNR Mapper**	
	Is this in or near a DEC-regulated/NWI wetland? **HVNR Mapper**	
	Other significant biodiversity or habitat data?	
	Is this a biologically important barrier? **HVNR Mapper**	

Road/Culvert improvements	Designs for improved structure: Describe repairs/improvements needed	
	Improved safety and mobility? *(Improving a sidewalk, sight lines, etc.)*	
	Describe in detail the improvement of route access needs for critical services, other needs for route, etc. *Emergency evacuation route? Will failure strand residents?* **Local**	
	Surveys of structure: Does it exist? If not, who would do it? **Local**	
	How does the improvement fit within zoning and/or comprehensive plan? *(If the town doesn't have a plan, can the grant be used to develop one in part?)*	
	Permits needed/anticipated **DEC Permitting staff**	
	Estimated and itemized structure costs:	
	Engineering costs **Local/Engineering Firm**	
	Equipment / Materials **Local/Hwy dept**	
	Personnel costs **Local/Hwy dept**	
	Road rebuild costs **Local/Hwy dept**	
	Cost/Benefit analysis **Local**	
	Other municipal offices involved and contacted (Planning, Highway, Zoning, etc.) **Local**	
	Are there other properties/structures nearby that will benefit? **Local**	
	Smart Growth law compatible? **(aka. Promotes resilient infrastructure vs. increased suburban/exurban development)** https://www.dot.ny.gov/programs/smart-planning/smartgrowth-law	

	Possible Matching funds/ resources/contributions for services? List groups that may be interested. **Local knowledge**	
	Is this location identified in a hazard mitigation plan?	
	Environmental Justice Community? Does the project improve an area with underserved communities? *(may be relevant to some applications)* **Local**	
Stakeholders/Partners: Potential letters of support: List names and contact info	Town officials	
	Adjacent landowners affected	
	Regional fisheries biologists	
	Regulators (DEC, Army Corps of Engineers, Soil & Water)	
	NRCS	
	Local environmental groups?	
	Local Conservation Advisory Committee	
	Columbia County Environmental Management Council	
	Watershed Groups?	
	Other Potential Partners?	

E. Stream Simulation Design (SSD)

Stream simulation is a method for designing and building road-stream crossings that mimic the natural stream channel. It aims to prevent habitat fragmentation by providing continuity through crossing structures and allowing unrestricted movements for aquatic organisms. SSD replicates physical characteristics of the natural channel upstream of the structure. Wildlife movement and natural processes can continue if the structure was not there at all. Components of SSD allow for a dynamic channel that can adjust during high water periods and allow proper hydraulic capacity as well as passage of varying sized debris. These are three general rules to follow to achieve the goal of maintaining healthy ecological connectivity as well as safe transportation networks while designing crossings (Forest Service Stream-Simulation Working Group 2008):

1. The design should fit both the stream and the road, not just the road.
2. Minimum intervention in the stream process results in the least risk of failure.
3. Crossings should present no greater challenge to organism movement than the stream being crossed.

Specific components of SSD that follow these principles include (Forest Service Stream-Simulation Working Group 2008):

- Structure width is equivalent to or exceeds the bankfull width of the natural channel.
- Structure substrate should have similar mobility and stability properties to that of the natural bed material of the stream channel.
- Provide sufficient hydraulic capacity and passage of debris during a 100-year flood.
- Provide adequate space between 100-year flood water level and top of the structure utilizing a head-water-to-depth ratio less than 0.8, allowing room for debris to pass without clogging the structure.
- The stream within the structure should have the capability to adjust dimensions in response to a wide range of floods and sediment or wood inputs without compromising the movement needs of aquatic organisms or the hydraulic capacity of the structure.

Although SSD structures may have a higher initial cost, they may save significantly more money in the long run. Long-term maintenance and replacement costs of both the structure and road must be assessed when planning a crossing. It’s key to learn which structures best meet project objectives by comparing their total costs to the benefits they offer (Forest Service Stream-Simulation Working Group 2008). More information can be found at: https://www.fs.fed.us/eng/pubs/pdf/StreamSimulation/

F. HVA and LHCCD acknowledgment

Acknowledgements

Initial concept and all templates related to creation of the town-specific Road-Stream Crossing Management Plans were collaboratively developed by the Housatonic Valley Association (HVA) and the Lower Hudson Coalition of Conservation Districts (LHCCD).

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G. PE7 Action: Culverts & Dams

2 — 24 Points

A. Why is this action important?

Hydraulic obstructions, such as dams, culverts, and bridges can contribute to localized flooding near road-stream crossings, and present a hazard to the community if they are routinely overtopped or washed out. Intense precipitation can cause more water and debris than usual to be carried by streams, resulting in debris jams, overflows, scour, or even washouts of culverts and bridges that are too small.

Many dams in New York State (NYS) are not properly maintained, are past their engineered lifespan, and/or were not constructed with climate change in mind. They can present a flooding hazard to upstream communities and, in the event of a dam failure, to downstream communities as well. Some municipalities and private dam owners are interested in removing their dam if the right support and resources are offered.

Fish and many other organisms use rivers and streams as pathways to move between feeding, nursery, and breeding grounds. Many culverts and dams disrupt this "aquatic connectivity" because they act as barriers to fish and wildlife movement.

This Climate Smart Communities (CSC) action focuses on removing dams and correctly sizing bridges and culverts to maintain beneficial floodplain functions and restore natural stream conditions, which can reduce flooding impacts and restore aquatic connectivity.

B. How to implement this action

Follow the steps and guidance below to implement this action. Your municipality can assess and prioritize culverts and bridges separately from dams, or address them all together in one combined process and resulting plan.

Culverts and Bridges

1) **Assess stream crossings in your municipality**, both publicly and privately owned, that have caused flooding or may cause flooding in the future due to changes in precipitation from climate change or changes in upstream land use. For assessing road-stream crossings, use the North Atlantic Aquatic Connectivity Collaborative (NAACC) assessment protocol. If a FEMA flood insurance study is available, then hydraulic obstructions may be shown on river or stream profiles. Other sources of data that may identify hydraulic obstructions sources include the following:

- Army Corps of Engineers
- United States Geological Survey (USGS)
- Natural Resource Conservation Service
- Soil and Water Conservation Districts
- Local flood analyses
- Local or regional watershed assessments (See Section G below for examples of tools and protocols)
- Local and/or County Hazard Mitigation Plans
- State Department of Transportation
- Local Department of Public Works (for data concerning local flooded infrastructure)
- Local experience

When evaluating sites, consider the larger watershed context and effects both up and down stream. Problems could arise from the following:

- Undersized crossings
- Shallow crossings
- Perched crossings
- Multiple culverts at one stream crossing

2) **Create a road-stream crossing management plan** for identified crossings for municipalities to use as a resource to right-size and improve undersized and deficient crossings. Prioritize culverts and bridges for right-sizing based on flooding and aquatic connectivity risk (see resources in Section G). Include the road-stream crossing management plan as a chapter of other relevant plans such as capital planning or hazard mitigation. Include implementation and funding strategies.

3) **Install a right-sized culvert or bridge**. Work with local soil and water conservation districts, qualified engineers, and the NYS Department of Environmental Conservation (DEC) staff to design the appropriate type of stream crossing and minimize impact to the stream. Best practices include the following:

- Use open-bottomed culverts, that span at least 1.25 times the bank full width, where possible, to reduce barriers to aquatic life.
- Use the most recent flow volume standards and incorporate projections of future rainfall subject to climate change (see NYS Flood Risk Management Guidance). Size to the 100-year storm event where possible.
- Local bridges and culvert projects that receive federal funding have to follow the NYS DOT Design Manual (DM). The DM requires that 10 and 20 percent (depending on the part of the state) must be added to the current peak flows. The 50 year flow needs to be used for culverts.
- Contact the DEC to determine if a permit is necessary. Permits are required for streams classified as C(T) or higher quality (ECL Article 15-0501), navigable bodies of water (ECL Article 15-0505), and DEC regulated wetlands (ECL Article 24).
- Evaluate the impact of removal of the hydraulic obstruction. Determine the benefits such as decrease in floodplain area, reduced road closures and damage, or increased fish and wildlife habitat connectivity. Also, examine the costs such as increased downstream flooding or loss of wetlands.
- Prepare a maintenance and inspection plan for structures such as bridges and culverts that may need to be checked for structural deficiencies, erosion, undermining, and debris buildup. Refer to and update the plan as conditions change.
- Perform annual maintenance on all culverts and stream crossing structures and check for structural deficiencies, undermining and debris buildup. Refer to and update management plan as conditions change.

Dams

1) **Create an inventory of dams in the municipality**, both publicly and privately owned. Assess their ownership and maintenance status, and if they are serving an important community need, such as water supply, flood control, and/or power generation. Assess which dams pose a significant threat to fish migration and aquatic connectivity (e.g., Biologically Important Barriers in the Hudson River Estuary (PDF).

2) **Remove a dam** by working with local and regional DEC staff, town engineers and attorneys, and other stakeholders, as necessary. Follow the guidance from the DEC and partners (see resources in Section G). Contact dam owners to solicit interest in removal or stream restoration. Prioritize removal of dams that are in hazardous condition and/or pose significant threat to aquatic connectivity/fish migration.

C. Timeframe, project costs, and resource needs

The timing and costs to assess a road-stream crossing will vary according to the amount of staff time needed to perform the assessment or the cost to hire a consultant to perform the assessment(s) using the NAACC protocol. The timing and costs to right-size a stream crossing depends on the number of crossings to be replaced and the type and extent of upgrade or replacement involved. Dam removal projects require several planning steps and can be a lengthy process. Costs of these projects are variable, depending on the complexity of the upgrading or mitigation strategy. An additional timing constraint involves applying for the necessary permits. Local governments will typically need to devote some staff time and capital resources for the improvement of stream crossings and removal of unwanted dams.

D. Which local governments implement this action? Which departments within the local government are most likely to have responsibility for this action?

This action is applicable to all types of local governments. The department or staff responsible for public works, highways or engineering are most appropriate to lead this action, although dam removal projects will likely need help from dam removal experts outside the municipal staff. Culvert resizing should be included in municipal highway annual maintenance plans. For this effort to be successful, cross-department involvement and support are recommended. Private landowner partnerships will be needed in many cases. Municipal committees, such as CSC task forces, conservation advisory councils, environmental conservation committees, or watershed groups may also be involved. This action could be led by another organization, such as a county agency, but the local government must demonstrate substantial involvement in the effort to receive points.

E. How to obtain points for this action

Points for this action are tiered based on completion of the components described below. All must have occurred within ten years prior to the application date.

	POSSIBLE POINTS
Conduct an assessment of all road-stream crossings that fall under the responsibility of the local government using the NAACC protocol	2
Develop a road-stream crossing municipal management plan that prioritizes crossings for replacement based on threats to flooding and aquatic connectivity	2
Right-size at least one culvert or bridge. It must not be a barrier to aquatic connectivity and must be sized to future climate projections (e.g., to the standards recommended in the Draft NYS Flood Risk Management Guidance). A maximum of 12 points is available for 2 (or more) right-sizing projects	6
Conduct a dam inventory	2
Remove one or more dams identified as barriers to aquatic connectivity and/or are in hazardous condition	6

F. What to submit

This action has five different tiers of points (as above); clearly describe the tiers for which the local government is applying. For assessment and management plan(s) for culverts and bridges, and/or a dam inventory, submit copies of the reports (or the web addresses for them).

For points associated with right-sizing culverts or bridges, or removing dams, submit evidence of completion, such as before and after photographs, and a description of the reason and design for removal or right-sizing. Applicants may receive points for any of these actions over a 10-year period.

All CSC action documentation is available for public viewing after an action is approved. Action submittals should not include any information or documents that are not intended to be viewed by the public.

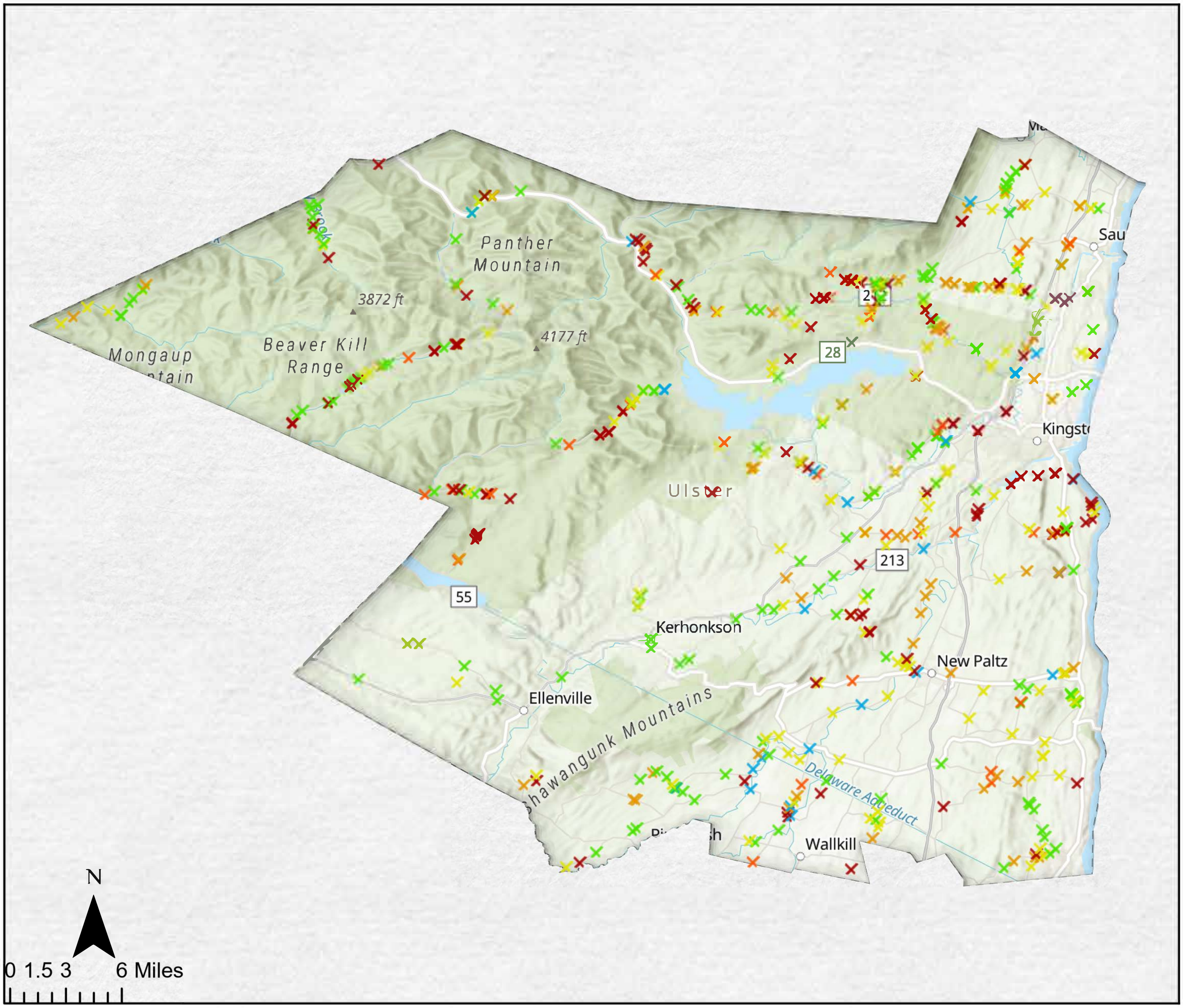
G. Links to additional resources or examples

- DEC Stream Crossings: Guidelines and Best Management Practices
- DEC, Aquatic Connectivity and Barrier Removal
- NYS Flood Risk Management Guidance
- Identification of Biologically Important Barriers in the Hudson River Estuary (PDF)

- Cornell WRI Aquatic Connectivity and Barrier Removal program with Interactive Aquatic Connectivity map
- DEC, Stream Crossings: Protecting and Restoring Stream Continuity
- DEC, Environmental Resource Mapper
- DEC, Hudson Valley Natural Resource Mapper with dam inventory and assessed road-stream crossings
- DEC, Dam Removal and Barrier Mitigation draft guidance (PDF)
- North Atlantic Aquatic Connectivity Collaborative (NAACC) Assessment protocol
- NYS Department of Transportation (DOT) Highway Design Manual
- NYS DOT, Bridge Manual
- Cornell University Local Roads Program
- Riverkeeper Dam Removal
- Northeast Regional Climate Center, Extreme Precipitation in New York & New England
- USGS StreamStats
- USGS Future Flow Explorer
- FEMA Hazard Mitigation Assistance and Public Assistance grants
- High Hazard Potential Dam Rehabilitation Grant Program

H. Recertification Requirements

The recertification requirements are the same as the initial certification requirements.



H. Ulster County NAACC Assessed Road Stream Crossings

Road Stream Crossings on Ulster County Roads

NAACC Evaluation

- No barrier
- Insignificant barrier
- Minor barrier
- Moderate barrier
- Significant barrier
- Severe barrier

Map by Ulster County Department of the Environment 2021

*Data sources: North Atlantic Aquatic Connectivity Collaborative (2015-current) and Ulster County. for more information please see www.naacc.org
Methodology: Crossing sites selected within 25 feet of County Roads.

I. Ulster County Road Stream Crossings

Survey_Id	Crossing_Code	Aqua_Pass_Score	AOP	Crossing_Comment	Crossing_Condition	Crossing_Type	Date_Observed	Evaluation	Location_Description	Observer	Road	Stream_Name	Town
36652	xy4203801174158392	-1	No AOP		Unknown	Bridge	2016-06-14	no score - missing data	at Penny Lane	Wolfson, Mandy	Wittenberg	unknown	Woodstock
37145	xy4204471074021780	-1	no score - missing data	wetland to wetland	Unknown	Culvert	2016-07-19	no score - missing data	glasco tpk	Wolfson, Mandy	Glasco Tpk	unknown	Saugerties
37276	xy4204014673994318	-1	no score - missing data	inaccessible outlet. Culvert empties directly into Plattekill Creek	OK	Inaccessible	2016-07-20	no score - missing data	glasco tpk	Wolfson, Mandy	Glasco Tpk	to Plattekill Creek	Saugerties
37326	xy4203504673975667	-1	no score - missing data	steep, overgrown banks	No data	Inaccessible	2016-07-20	no score - missing data	by Jackson Hill Road	Wolfson, Mandy	Glasco Tpk	Tributary to Esopus Creek	Saugerties
37386	xy4195590573980258	-1	no score - missing data	inaccessible, could not locate	No data	Inaccessible	2016-07-26	no score - missing data	Frank Sottile	Wolfson, Mandy	Frank Sottile	unknown	Ulster
41408	xy4197300074082800	-1	No AOP		Poor	Culvert	2016-09-29	no score - missing data	near Hoyer Rd	Wolfson, Mandy	Rt 28A	unknown	Ulster
41411	xy4197506074086177	-1	Reduced AOP	main culvert #3 completely submerged	Unknown	Culvert	2016-09-29	no score - missing data	at wetlands	Wolfson, Mandy	Rt 28A	unknown	Ulster
41411	xy4197506074086177	-1	Reduced AOP	main culvert #3 completely submerged	Unknown	Culvert	2016-09-29	no score - missing data	at wetlands	Wolfson, Mandy	Rt 28A	unknown	Ulster
41411	xy4197506074086177	-1	Reduced AOP	main culvert #3 completely submerged	Unknown	Culvert	2016-09-29	no score - missing data	at wetlands	Wolfson, Mandy	Rt 28A	unknown	Ulster
41502	xy4187166673952378	-1	no score - missing data	local id 081-03	OK	Culvert	2016-10-31	no score - missing data	directly at Hudson River	Wolfson, Mandy	River Road	trib to Hudson River	Esopus
47500	xy4169202673979608	-1	no score - missing data	submerged culvert bordering large wetland created due to culvert blockage, leads to catch basin before reconnecting with stream on private property, frequently causes adjacent property to flood	Unknown	Partially Inaccessible	2017-06-29	no score - missing data	near Deller Rd., bordering large wetland	Clark, Johnathan	Chapel Hill Rd.	unnamed	Lloyd
48884	xy4182562674005352	-1	no score - missing data	outlet blocked by large rose bush	OK	Partially Inaccessible	2017-07-18	no score - missing data	near house No. 866	Clark, Johnathan	Old Post Rd.	Swarte Kill	Esopus
49864	xy4174168674110882	-1	no score - missing data		OK	No Upstream Channel	2017-07-27	no score - missing data	near intersection with Rt. 299	Clark, Johnathan	Libertyville Rd.	stream draining from wetland into Wallkill River	New Paltz
49864	xy4174168674110882	-1	no score - missing data		OK	No Upstream Channel	2017-07-27	no score - missing data	near intersection with Rt. 299	Clark, Johnathan	Libertyville Rd.	stream draining from wetland into Wallkill River	New Paltz

Survey_Id	Crossing_Code	Aqua_Pass_Score	AOP	Crossing_Comment	Crossing_Condition	Crossing_Type	Date_Observed	Evaluation	Location_Description	Observer	Road	Stream_Name	Town
78842	xy4210818173955410	-1	no score - missing data	Other 2 embankment 1 total failure crushed part of inlet. Other 3 span barrel 1. Culverts have completely rotted out and are just one open space in the middle.	Poor	Partially Inaccessible	44046	no score - missing data	After thruway before sparling rd	Ganon, Ben	Malden tpk	Unnamed	Saugerties
78842	xy4210818173955410	-1	no score - missing data	Other 2 embankment 1 total failure crushed part of inlet. Other 3 span barrel 1. Culverts have completely rotted out and are just one open space in the middle.	Poor	Partially Inaccessible	44046	no score - missing data	After thruway before sparling rd	Ganon, Ben	Malden tpk	Unnamed	Saugerties
76987	xy4197506074086177	-1	no score - missing data		OK	No Upstream Channel	43994	no score - missing data	Near 25 mph sign	Ganon, Ben	Rt 28a	Unnamed	Hurley
76987	xy4197506074086177	-1	no score - missing data		OK	No Upstream Channel	43994	no score - missing data	Near 25 mph sign	Ganon, Ben	Rt 28a	Unnamed	Hurley
76987	xy4197506074086177	-1	no score - missing data		OK	No Upstream Channel	43994	no score - missing data	Near 25 mph sign	Ganon, Ben	Rt 28a	Unnamed	Hurley
77807	xy4191341674181776	-1	no score - missing data	Stream may have been moved no us channel	Poor	No Upstream Channel	44019	no score - missing data	Near Martin ln	Ganon, Ben	Atwood rd	Unnamed	Marbletown
76922	xy4187023974152575	-1	no score - missing data	Round concrete pipe 4 ft under stone head wall. Other photo one is of inlet.	OK	Partially Inaccessible	43992	no score - missing data	In large field	Ganon, Ben	Atwood rd	Unnamed	Marbletown
78028	xy4211894974020156	-1	no score - missing data	Inlet not accessible due to wall. Outlet not accessible due to poison ivy	OK	Inaccessible	44025	no score - missing data	Near pole k36250	Ganon, Ben	Blue mountain rd	Unnamed	Saugerties
78030	xy4211729174057219	-1	no score - missing data	Ds not accessible due to topography. Other 2 we called steep riffle so we could note it in the data.other 3 high erosion at inlet	New	Partially Inaccessible	44025	no score - missing data	Near 565 w saugerties rd	Ganon, Ben	W saugerties rd		Saugerties
78717	xy4210962574016528	-1	no score - missing data		OK	Partially Inaccessible	44041	no score - missing data	At dam leading from reservoir	Ganon, Ben	Reservoir rd	Plattekill Creek	Saugerties
79445	xy4204511074024920	-1	no score - missing data	Outlet inaccessible due to poison ivy. Outlet dimensions approximated	OK	Partially Inaccessible	44064	no score - missing data	By blackberry ln and glasco tpk	Parmelee, Kiah	Glasco tpk		Saugerties

Survey_Id	Crossing_Code	Aqua_Pass_Score	AOP	Crossing_Comment	Crossing_Condition	Crossing_Type	Date_Observed	Evaluation	Location_Description	Observer	Road	Stream_Name	Town
79448	xy4204014673994318	-1	no score - missing data	Inaccessible due to a ridiculous amount of poison ivy on inlet and fence at outlet	No data	Inaccessible	44064	no score - missing data	House 669	Parmelee, Kiah	Glasco tpk	Unnamed	Saugerties
37086	xy4209742374055591	0	No AOP		OK	Culvert	2016-07-05	Severe barrier	Saugerties Woodstock road	Wolfson, Mandy	W. Saugerties Woodstoc k Rd	unknown	Saugerties
41227	xy4190627074175530	0	No AOP		OK	Culvert	2016-09-20	Severe barrier	passed Vly-Atwood	Wolfson, Mandy	Atwood	trib to Esopus	Marathon
41501	xy4186619273954017	0	Reduced AOP	local id 081-02	OK	Culvert	2016-10-31	Severe barrier	by house # 272	Wolfson, Mandy	River Road	trib to Hudson	Esopus
47907	xy4160594073997935	0	No AOP	rock dam downstream	OK	Culvert	2017-07-06	Severe barrier	near box No. 387	Clark, Johnathan	Lattintow n Rd.	tributary to Lattintown Creek	Marlboroug h
49591	xy4177857574126883	0	No AOP	seasonal mountain stream	OK	Culvert	2017-07-25	Severe barrier	northwest of Spies Rd.	Clark, Johnathan	Mountain Rest Rd.	tributary to Kleine Kill	New Paltz
49596	xy4177815474127492	0	No AOP	seasonal mountain stream	OK	Culvert	2017-07-25	Severe barrier	northwest of Spies Rd.	Clark, Johnathan	Mountain Rest Rd.	tributary to Kleine Kill	New Paltz
50783	xy4165295274165305	0	No AOP		OK	Culvert	2017-08-01	Severe barrier	near Rosedale Nurseries	Clark, Johnathan	Sand Hill Rd.	unnamed	Gardiner
51163	xy4159412374141662	0	No AOP		OK	Bridge	2017-08-08	Severe barrier	near house No. 364	Clark, Johnathan	Plains Rd.	tributary to Wallkill River	Shawangunk
59498	xy4185033474433754	0	No AOP		OK	Culvert	2018-06-14	Severe barrier	By House 239	Johnston, Christopher	Yeagervile Road	Unnamed	Wawarsing
60016	xy4199926374055275	0	No AOP	Large build up of rocks 10 feet downstream preventing passage	OK	Culvert	2018-06-20	Severe barrier	Just before Shining Path Road	Johnston, Christopher	Morey Hill Road	Trib of Saw Kill	Woodstock
60716	xy4205458074142010	0	No AOP	Would have large scour pool if water was present	OK	Culvert	2018-07-02	Severe barrier	House 422	Johnston, Christopher	Upper Byrdcliffe Road	Unnamed	Woodstock
61247	xy4199681074465360	0	No AOP		OK	Culvert	2018-07-09	Severe barrier	Just before field of ferns on right hand side uphill	Johnston, Christopher	Frost Valley Road	Unnamed	Denning
62130	xy4197458374524807	0	No AOP	outlet drains into large river	OK	Culvert	2018-07-09	Severe barrier	on bend after red rusted bridge	Johnston, Christopher	Frost Valley Road	Trib to West Branch Neversink River	Denning
62239	xy4194069474576087	0	No AOP	Large waterfall feeds culvert	OK	Multiple Culvert	2018-07-10	Severe barrier	On bend at large waterfall	Johnston, Christopher	Frost Valley Road	Trib to West Branch Neversink River	Denning
62239	xy4194069474576087	0	No AOP	Large waterfall feeds culvert	OK	Multiple Culvert	2018-07-10	Severe barrier	On bend at large waterfall	Johnston, Christopher	Frost Valley Road	Trib to West Branch Neversink River	Denning
62911	xy4195021174318862	0	No AOP	Very large and high slow cascade at outlet, substrate build up on right side	OK	Culvert	2018-07-30	Severe barrier	Just before South Hollow Road	Johnston, Christopher	Watson Hollow Road	Mine Hollow Brook	Olive

Survey_Id	Crossing_Code	Aqua_Pass_Score	AOP	Crossing_Comment	Crossing_Condition	Crossing_Type	Date_Observed	Evaluation	Location_Description	Observer	Road	Stream_Name	Town
62913	xy4194421074323370	0	No AOP	Outlet covered in vines	OK	Culvert	2018-07-30	Severe barrier	By stairs leading to red house	Johnston, Christopher	Watson Hollow Road	Trib to Bush Kill	Olive
62917	xy4193412774330022	0	No AOP	Rock wall on left side pushing water into culvert	OK	Culvert	2018-07-30	Severe barrier	Where guard rail starts after 20 mph turn sign	Johnston, Christopher	Watson Hollow Road	Unnamed	Olive
62919	xy4193155874336730	0	No AOP	Tire upstream.	OK	Culvert	2018-07-30	Severe barrier	On large bend	Johnston, Christopher	Watson Hollow Road	Unnamed	Olive
49578	xy4189353874017168	0.002000178	No AOP	CIN C870122, steep waterfall and large retaining pool upstream	OK	Culvert	2017-07-25	Severe barrier	at intersection with Rt. 213	Clark, Johnathan	New Salem Rd.	Sugarbush Creek	Esopus
41505	xy4189964773996522	0.006657095	No AOP	lots of knotweed on downstream side	Poor	Culvert	2016-11-03	Severe barrier	at # 419, from pond	Wolfson, Mandy	New Salem	unknown	Esopus
48693	xy4187899073955200	0.009378436	No AOP	seasonal stream draining into Hudson River	OK	Culvert	2017-07-17	Severe barrier	north of river access site	Clark, Johnathan	River Rd.	unnamed	Esopus
37248	xy4204381074006530	0.012415123	No AOP		OK	Culvert	2016-07-20	Severe barrier	glasco tpk	Wolfson, Mandy	Glasco Tpk	trib to Plattekill Creek	Saugerties
51220	xy4173889874168993	0.012415123	No AOP		OK	Culvert	2017-08-10	Severe barrier	at intersection with Sparkling Ridge Rd.	Clark, Johnathan	Rt. 299	unnamed	Gardiner
59982	xy4185354174432165	0.015816997	No AOP		OK	Culvert	2018-06-14	Severe barrier	Next to House 257	Johnston, Christopher	Yeagervill e Road	Unnamed	Wawarsing
62149	xy4197074074529450	0.019643956	No AOP		OK	Culvert	2018-07-10	Severe barrier	About 1 mile down from bend	Johnston, Christopher	Frost Valley Road	Trib to West Branch Neversink River	Denning
76965	xy4204381074006530	0.019643956	No AOP		OK	Culvert	43993	Severe barrier	Near platte creek maple	Ganon, Ben	Glasco tpk	Unnamed	Saugerties
76967	xy4203504673975667	0.023968432	No AOP		OK	Culvert	43993	Severe barrier	Glasco and Jackson hill rd	Ganon, Ben	Glasco tpk	Unnamed	Saugerties
76849	xy4203812074162730	0.023968432	No AOP	Landowner reports frequent flooding east of crossing.	OK	Culvert	43991	Severe barrier	Next to house number 89	Ganon, Ben	Wittenber g Rd	Unnamed	Woodstock
36495	xy4205150074141540	0.034482537	No AOP	ditch line feeds into inlet at 90 degrees	OK	Culvert	2016-05-31	Severe barrier	Glasco Tpk	Wolfson, Mandy	Glasco Tpk	unknown	Woodstock
36654	xy4203812074162730	0.034482537	No AOP		OK	Culvert	2016-06-14	Severe barrier	wittenberg	Wolfson, Mandy	Wittenber g	unknown	Woodstock
36842	xy4202164074079620	0.034482537	No AOP		OK	Culvert	2016-06-21	Severe barrier	Zena	Wolfson, Mandy	Zena	trib to Sawkill	Woodstock
37132	xy4204945074026080	0.034482537	No AOP		OK	Culvert	2016-07-14	Severe barrier	Highwoods Road	Wolfson, Mandy	Highwood s Road	unknown	Saugerties
41492	xy4186377073959310	0.034482537	No AOP	local id 081-01	OK	Culvert	2016-10-31	Severe barrier	near house # 305	Wolfson, Mandy	River Road	trib to Hudson River	Esopus
60719	xy4205433674146134	0.034482537	No AOP		OK	Culvert	2018-07-02	Severe barrier	On small bend just before West Byrdcliffe Street	Johnston, Christopher	Upper Byrdcliffe Road	Trib to Tannery Brook	Woodstock
62234	xy4194121474575523	0.034482537	No AOP	Flows off bank of hill and into West Branch Neversink River	OK	Culvert	2018-07-10	Severe barrier	Near where guard rail starts on river side	Johnston, Christopher	Frost Valley Road	Trib to West Branch Neversink River	Denning
36504	xy4204892074113530	0.04833815	No AOP		OK	Culvert	2016-05-31	Severe barrier	glasco tpk	Wolfson, Mandy	Glasco Tpk	unknown	Woodstock

Survey_Id	Crossing_Code	Aqua_Pass_Score	AOP	Crossing_Comment	Crossing_Condition	Crossing_Type	Date_Observed	Evaluation	Location_Description	Observer	Road	Stream_Name	Town
37308	xy4203763073983000	0.04833815	No AOP	other pipes discharging into stream at culvert	OK	Culvert	2016-07-20	Severe barrier	near post office	Wolfson, Mandy	Glasco Tpk	Tributary to Esopus Creek	Saugerties
48450	xy4185403273985310	0.04833815	No AOP		OK	Culvert	2017-07-13	Severe barrier	near intersection with Esopus Ave.	Clark, Johnathan	Union Center Rd.	unnamed	Esopus
62173	xy4195650074547600	0.04833815	No AOP	Connects pond to West Branch Neversink River	OK	Culvert	2018-07-10	Severe barrier	Next to Horse field	Johnston, Christopher	Frost Valley Road	Trib to West Branch Neversink River	Denning
60692	xy4205501574133828	0.056964168	No AOP	Stream is mostly dry upstream and downstream	OK	Culvert	2018-07-02	Severe barrier	Between House 324 and 327	Johnston, Christopher	Upper Byrdcliffe Road	Trib to Tannery Brook	Woodstock
60891	xy4203272474127540	0.056964168	No AOP	Free falls onto man made concrete block	OK	Culvert	2018-07-03	Severe barrier	House 24	Johnston, Christopher	Broadview Road	Trib to Saw Kill	Woodstock
41220	xy4190299874107120	0.067055178	Reduced AOP		OK	Culvert	2016-09-08	Severe barrier	between Johnson Hill and Canary Hill roads	Wolfson, Mandy	Hurley Mountain Rd	trib to Stony Creek	Marbletown
60693	xy4205664974134018	0.067055178	No AOP	Large drop caused by flat stone in Inlet	OK	Culvert	2018-07-02	Severe barrier	Before mailbox 52	Johnston, Christopher	Webster Road	Trib to Tannery Brook	Woodstock
79447	xy4204945074026080	0.067055178	No AOP	Other 2 headwall 3, still in place but scouring	OK	Culvert	44064	Severe barrier	Bend in road by house 94	Parmelee, Kiah	Highwoods rd	Unnamed	Saugerties
79046	xy4194977874021047	0.078947156	No AOP	Other2 headwall Is a 5. Other 3 embankment is a 3 with high erosion and projecting outlet	OK	Culvert	44050	Severe barrier	Near care design sign	Ganon, Ben	Sawkill rd	Unnamed	Ulster
77640	xy4202929874084032	0.078947156	No AOP	Other 2 high erosion upstream left bank	Poor	Culvert	44012	Severe barrier	Mailbox 729	Ganon, Ben	Zena rd	Unnamed	Woodstock
37384	xy4200770473999288	0.078947156	No AOP		OK	Culvert	2016-07-26	Severe barrier	north of Bogert Ln	Wolfson, Mandy	Old King's Hwy	tributary to Esopus Creek	Ulster
41213	xy4194060374062269	0.078947156	No AOP	waterfall upstream	OK	Culvert	2016-09-08	Severe barrier	at waterfall	Wolfson, Mandy	Hurley Mountain Road	unknown	Hurley
47505	xy4166083873966227	0.078947156	No AOP		OK	Culvert	2017-06-29	Severe barrier	near house No. 230	Clark, Johnathan	Milton Tpke.	unnamed	Marlborough
48437	xy4189723473969257	0.078947156	No AOP	stream rerouted under property downstream	OK	Culvert	2017-07-13	Severe barrier	near house No. 35	Clark, Johnathan	River Rd.	unnamed	Esopus
48695	xy4185692173975177	0.078947156	No AOP		OK	Culvert	2017-07-17	Severe barrier	near intersection with Ulster Ave.	Clark, Johnathan	Union Center Rd.	unnamed	Esopus
59999	xy4159936074352510	0.078947156	No AOP		OK	Culvert	2018-06-18	Severe barrier	House 1172	Johnston, Christopher	Burlingham Road	Unnamed	Shawangunk
60877	xy4205117674173093	0.078947156	No AOP	2 streams converge to flow into culvert	OK	Culvert	2018-07-03	Severe barrier	Right before fork in the road after passing Echo Lane	Johnston, Christopher	Coopers Hollow Lane	Unnamed	Woodstock
59480	xy4185248874432724	0.093072239	No AOP		OK	Culvert	2018-06-14	Severe barrier	By House 249	Johnston, Christopher	Yeagerville Road	Unnamed	Wawarsing

Survey_Id	Crossing_Code	Aqua_Pass_Score	AOP	Crossing_Comment	Crossing_Condition	Crossing_Type	Date_Observed	Evaluation	Location_Description	Observer	Road	Stream_Name	Town
41434	xy4193477274043040	0.1	no score - missing data	stream buried upstream and downstream. Outlet not found	OK	Buried Stream	2016-10-04	Severe barrier	at Coleman School	Wolfson, Mandy	Hurley Ave	trib to Esopus	Ulster
77939	xy4193477274043040	0.1	no score - missing data	Upstream is two culverts combining into one, unable able to measure active channel.	OK	Buried Stream	44020	Severe barrier	In front of Coleman high school	Ganon, Ben	Hurley ave	Unnamed	Hurley
77485	xy4203812074162730	0.1	No AOP	Stream enters storm water system. Does not cross road. Piped across 212 in storm water system and enters to SAWkill at end of photo other1.	Unknown	Buried Stream	44008	Severe barrier	13 wittenberg	Ganon, Ben	Wittenberg rd	Unnamed	Woodstock
41215	xy4193957474070498	0.109990766	No AOP		OK	Culvert	2016-09-08	Severe barrier	near Thielpape Road	Wolfson, Mandy	Hurley Mountain Road	trib to Englishman	Hurley
41405	xy4197740774091022	0.109990766	No AOP	channelized from prior culvert to this culvert	OK	Culvert	2016-09-29	Severe barrier	at Beesmer Rd	Wolfson, Mandy	Rt 28A	unknown	Hurley
48448	xy4185615073981450	0.109990766	No AOP	upstream channel collects water from wetland, drains into Black Creek	OK	Culvert	2017-07-13	Severe barrier	near pole No.A54381	Clark, Johnathan	Union Center Rd.	tributary to Black Creek	Esopus
49899	xy4163828974191078	0.109990766	No AOP		OK	Culvert	2017-07-27	Severe barrier	near Kosteczko Dr.	Clark, Johnathan	Albany Post Rd.	tributary to Wallkill River	Shawangunk
76990	xy4194060374062269	0.109990766	No AOP	Inlet drop has a height of .4 ft	OK	Culvert	43994	Severe barrier	Next to Kaufman?s waterfall	Ganon, Ben	Hurley Mountain rd	Unnamed	Hurley
77813	xy4188676674249712	0.109990766	Reduced AOP		OK	Culvert	44019	Severe barrier	Kripplebush and upper sahler mill rd	Ganon, Ben	Kripplebush rd	Unnamed	Olive
78579	xy4199321374007295	0.130434581	No AOP	Other 2 headwall 3. Other 3 very high erosion ds rb.	OK	Culvert	44040	Severe barrier	House 2126	Ganon, Ben	Sawkill rd	Unnamed	Ulster
77307	xy4204984074134260	0.130434581	No AOP		OK	Culvert	44004	Severe barrier	Near 2401	Ganon, Ben	Glasco tpk	Unnamed	Woodstock
36656	xy4203755674169187	0.130434581	No AOP		OK	Culvert	2016-06-14	Severe barrier	wittenberg	Wolfson, Mandy	Wittenberg	unknown	Woodstock
41228	xy4190976974180574	0.130434581	No AOP		OK	Culvert	2016-09-22	Severe barrier	Atwood	Wolfson, Mandy	Atwood	unknown	Marbletown
41483	xy4199482673952646	0.130434581	No AOP	local id 099-02	OK	Culvert	2016-10-25	Severe barrier	at Terra Rd	Wolfson, Mandy	Ulster Landing Road	trib to Hudson	Ulster
59995	xy4166272474386172	0.130434581	No AOP		OK	Culvert	2018-06-18	Severe barrier	By House 240	Johnston, Christopher	Cragsmoor Road	Unnamed	Wawarsing
61172	xy4200183874447271	0.130434581	No AOP	Small drop midway through structure	OK	Culvert	2018-07-07	Severe barrier	Next to dirt road with wooden shack and blue equipment	Johnston, Christopher	Frost Valley Road	Trib to West Branch Neversink River	Shandaken
62158	xy4196906974531196	0.130434581	No AOP	Flow narrows and becomes shallower through structure	OK	Culvert	2018-07-10	Severe barrier	200 meters from 1-16	Johnston, Christopher	Frost Valley Road	Unnamed	Denning

Survey_Id	Crossing_Code	Aqua_Pass_Score	AOP	Crossing_Comment	Crossing_Condition	Crossing_Type	Date_Observed	Evaluation	Location_Description	Observer	Road	Stream_Name	Town
77805	xy4191844874192107	0.155364782	No AOP	Other 2 high erosion us lb_x000D_ Downstream high erosion	OK	Culvert	44019	Severe barrier	House 4600	Ganon, Ben	Atwood rd	Unnamed	Marbletown
51217	xy4166285374224317	0.155364782	No AOP		OK	Culvert	2017-08-08	Severe barrier	south of Tillson Lake Rd.	Clark, Johnathan	Bruynswick Rd.	tributary to Wallkill River	Gardiner
76846	xy4205250474146245	0.181923199	No AOP		OK	Culvert	43990	Severe barrier	In between house 260 262	Ganon, Ben	Glasco tpk	Unnamed	Woodstock
41435	xy4194977874021047	0.186046322	No AOP	local id 042-1	OK	Culvert	2016-10-04	Severe barrier	next to # 153	Wolfson, Mandy	Sawkill	unknown	Ulster
41503	xy4187662073955010	0.186046322	No AOP	local id 081-04	OK	Culvert	2016-10-31	Severe barrier	on Hudson River	Wolfson, Mandy	River Road	trib to Hudson River	Esopus
41504	xy4190169273983102	0.186046322	No AOP	local id 057-01	OK	Culvert	2016-11-03	Severe barrier	Past Millbrook Drive.	Wolfson, Mandy	New Salem	trib to Rondout Creek	Esopus
50793	xy4163473474190941	0.186046322	No AOP		OK	Culvert	2017-08-03	Severe barrier	near Old Galeville Rd.	Clark, Johnathan	Albany Post Rd.	unnamed	Shawangunk
60343	xy4200610074093980	0.186046322	No AOP	Water stops in middle of culvert likely caused by a hole	OK	Culvert	2018-06-25	Severe barrier	Near intersection with Van Dale Road	Johnston, Christopher	Sandy Court	Unnamed	Hurley
76994	xy4197740774091022	0.186046322	No AOP		OK	Culvert	43994	Severe barrier	Intersection of county rd 50 and beesmer rd. Missing photos	Ganon, Ben	Rt 28a	Unnamed	Hurley
77932	xy4214150474006591	0.186046322	No AOP	Other 2 is high erosion ds rb	OK	Culvert	44021	Severe barrier	Near vanroy sign	Ganon, Ben	Blue mountain rd	Unnamed	Saugerties
76991	xy4193957474070498	0.22413775	No AOP		New	Culvert	43994	Significant barrier	Next to Thielpape rd and house number 4	Ganon, Ben	Hurley Mountain rd	Unnamed	Hurley
78119	xy4193423674074198	0.22413775	No AOP	No erosion either side	OK	Culvert	44027	Significant barrier	At intersect of eagles nest rd	Ganon, Ben	Hurley Mountain rd	Unnamed	Hurley
77804	xy4191870374211766	0.22413775	No AOP	Deep cuts within vegetation are high erosion us_x000D_ Other 2 high erosion ds lb	OK	Culvert	44019	Significant barrier	House 5019	Ganon, Ben	Atwood rd	Unnamed	Olive
41390	xy4190547074218357	0.22413775	No AOP		OK	Culvert	2016-09-27	Significant barrier	near Vly Rd	Wolfson, Mandy	Krumville	unknown	Olive
60374	xy4208790074154400	0.22413775	No AOP		OK	Culvert	2018-06-27	Significant barrier	Between 2 private roads on left going uphill	Johnston, Christopher	Hutchin Hill Road	Unnamed	Woodstock
60423	xy4202919974093812	0.22413775	Reduced AOP	Dry about 10 feet downstream	OK	Culvert	2018-06-27	Significant barrier	Just before Laura Lane	Johnston, Christopher	Chestnut Hill Road	Unnamed	Woodstock
59541	xy4183441274447191	0.259533767	No AOP		OK	Culvert	2018-06-14	Significant barrier	Before Phil Martin Road	Johnston, Christopher	Yeagerville Road	Unnamed	Wawarsing
76923	xy4190108074168040	0.271781364	Reduced AOP		OK	Culvert	43992	Significant barrier	Near 4273 atwood	Ganon, Ben	Atwood rd	Unnamed	Marbletown

Survey_Id	Crossing_Code	Aqua_Pass_Score	AOP	Crossing_Comment	Crossing_Condition	Crossing_Type	Date_Observed	Evaluation	Location_Description	Observer	Road	Stream_Name	Town
77567	xy4202977374125285	0.271781364	No AOP	Other 2 high erosion left bank upstream_x000D_ Other 3 is low erosion in minor spots left bank downstream	OK	Culvert	44011	Significant barrier	House 170	Ganon, Ben	Ohayo mountain road	Unnamed	Woodstock
36493	xy4205806874157946	0.271781364	No AOP		Poor	Culvert	2016-05-31	Significant barrier	Glasco Tpk	Wolfson, Mandy	Glasco Tpk	unnamed	Woodstock
36501	xy4204984074134260	0.271781364	No AOP		OK	Culvert	2016-05-31	Significant barrier	glasco tpk	Wolfson, Mandy	Glasco Tpk	unknown	Woodstock
41202	xy4207500474010471	0.271781364	Reduced AOP		OK	Culvert	2016-10-13	Significant barrier	at Joseph's Blvd	Wolfson, Mandy	Fish Creek	unknown	Saugerties
49879	xy4165995474180119	0.271781364	No AOP		OK	Culvert	2017-07-27	Significant barrier	near Deer Haven Ln.	Clark, Johnathan	Albany Post Rd.	tributary to Wallkill River	New Paltz
60283	xy4185441174089364	0.271781364	Reduced AOP		OK	Culvert	2018-05-31	Significant barrier	Culvert past man made dam	Johnston, Christopher	Sawdust Avenue	Unnamed	Rosendale
47499	xy4166980874033119	0.30954629	Reduced AOP		OK	Culvert	2017-06-26	Significant barrier	near wetland area close to intersection with Tuckers Corners Rd.	Clark, Johnathan	Milton Tpke.	unamed	Plattekill
36494	xy4205250474146245	0.331644425	No AOP		OK	Culvert	2016-05-31	Significant barrier	Glasco Tpk	Wolfson, Mandy	Glasco Tpk	unknown	Woodstock
36834	xy4202339074127140	0.331644425	Reduced AOP		OK	Culvert	2016-06-21	Significant barrier	Ohayo Mt Road	Wolfson, Mandy	Ohayo Mountain Road	unknown	Woodstock
36852	xy4201420574076228	0.331644425	Reduced AOP	from wetland	OK	Culvert	2016-06-21	Significant barrier	Zena	Wolfson, Mandy	Zena	trib to Sawkill	Woodstock
47109	xy4172376774009977	0.331644425	No AOP	sunfish observed near outlet, second culvert with severe free fall located immediately upstream	OK	Culvert	2017-06-22	Significant barrier	near Highland High School	Clark, Johnathan	Pancake Hollow Rd.	tributary to Black Creek	Lloyd
47834	xy4166162774032379	0.331644425	No AOP		OK	Culvert	2017-07-06	Significant barrier	near house No. 563	Clark, Johnathan	South St.	Quassaick Creek	Marlborough
48451	xy4185570873999918	0.331644425	No AOP		OK	Culvert	2017-07-13	Significant barrier	past Hardenburg Rd.	Clark, Johnathan	Union Center Rd.	unnamed	Esopus
50796	xy4159961474217999	0.331644425	No AOP		OK	Culvert	2017-08-03	Significant barrier	near Red Top Rd.	Clark, Johnathan	Albany Post Rd.	tributary to Dwaar Kill	Shawangunk
79558	xy4208093373971545	0.331644425	No AOP		OK	Culvert	44069	Significant barrier	By 1198	Parmelee, Kiah	Kings hwy	Unnamed	Saugerties
77572	xy4203102174108292	0.331644425	No AOP		Poor	Culvert	44011	Significant barrier	House 58	Ganon, Ben	Maverick rd	Unnamed	Hurley
48878	xy4182410073979720	0.336041393	No AOP		OK	Culvert	2017-07-18	Significant barrier	near Old Quaker Cemetery	Clark, Johnathan	Old Post Rd.	tributary to Black Creek	Esopus
36925	xy4201313174069713	0.337950658	Reduced AOP		OK	Culvert	2016-06-27	Significant barrier	at Kingston Reservoir 1	Wolfson, Mandy	Sawkill	trib to Sawkill (via Kingston Reservoir 1)	Woodstock

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76850	xy4203801174158392	0.389465655	No AOP	Beaver dam blocking almost 100 inside structure. Creating backwater wetland no active channel. Could not access inside structure.	OK	Culvert	43991	Significant barrier	Wittenberg and penny lane	Ganon, Ben	Wittenberg rd	Unnamed	Woodstock
78117	xy4196706074129723	0.40176178	No AOP	Other 2 is example of high erosion and failing armoring us lb. other 3 high erosion ds rb.	OK	Culvert	44027	Moderate barrier	House 83	Ganon, Ben	Spillway rd	Unnamed	Hurley
36830	xy4203032074125070	0.40677952	No AOP	hole in roadfill at outlet	OK	Culvert	2016-06-21	Moderate barrier	Ohayo Mountain Road	Wolfson, Mandy	Ohayo Mountain Road	unknown	Woodstock
36853	xy4200004074082170	0.40677952	Reduced AOP		OK	Culvert	2016-06-21	Moderate barrier	Zena near town boundary	Wolfson, Mandy	Zena	unknown	Woodstock
41445	xy4207829673973632	0.40677952	No AOP	concrete culvert under county road- then into rotted cmp under Thruway	OK	Culvert	2016-10-13	Moderate barrier	by house # 1194	Wolfson, Mandy	King's Hwy	Beaver Kill	Saugerties
47502	xy4166199474012011	0.40677952	No AOP		OK	Culvert	2017-06-29	Moderate barrier	near Ohara Rd.	Clark, Johnathan	Milton Tpke.	tributary to Lattintown Creek	Marlborough
60416	xy4206968274076029	0.40677952	No AOP		OK	Culvert	2018-06-27	Moderate barrier	Just past Partridge Road	Johnston, Christopher	Woodstock Ridge Road	Trib of Saw Kill	Woodstock
60880	xy4203193074157740	0.40677952	No AOP	2 structure at convergence of 2 streams	OK	Multiple Culvert	2018-07-03	Moderate barrier	Off small stretch of road between Upper Ohayo and Blueberry Hill Road	Johnston, Christopher	West Ohayo Mountain Road	Unnamed	Woodstock
60880	xy4203193074157740	0.40677952	No AOP	2 structure at convergence of 2 streams	OK	Multiple Culvert	2018-07-03	Moderate barrier	Off small stretch of road between Upper Ohayo and Blueberry Hill Road	Johnston, Christopher	West Ohayo Mountain Road	Unnamed	Woodstock
61588	xy4198480474507319	0.40677952	No AOP	Outlet feeds into YMCA lake	OK	Culvert	2018-07-09	Moderate barrier	At edge of lake	Johnston, Christopher	Frost Valley Road	Trib to Catskill State Park Ponds	Denning
77808	xy4190976974180574	0.40677952	No AOP	Other 2 high erosion us lb_x000D_ Other 3 high erosion ds lb	OK	Bridge	44019	Moderate barrier	Past house 4428	Ganon, Ben	Atwood rd	Unnamed	Marbletown
79685	xy4200770473999288	0.414467092	Reduced AOP	Other 2 span barrel 6	OK	Culvert	44077	Moderate barrier	North of house 97	Parmelee, Kiah	Kings hwy	Unnamed	Ulster
78195	xy4205018974067884	0.427903348	Reduced AOP	Other 2 of ds high erosion on lb	Poor	Culvert	44028	Moderate barrier	At intersect of 212	Ganon, Ben	Glasco tpk	Unnamed	Saugerties
77646	xy4201603974075257	0.436342852	No AOP	Other 2 high erosion both banks downstream	OK	Culvert	44012	Moderate barrier	Near tennis courts	Ganon, Ben	Sawkill rd	Unnamed	Woodstock
36930	xy4201481074073260	0.437871086	Reduced AOP	wetland to wetland	OK	Culvert	2016-06-27	Moderate barrier	next to house #1675	Wolfson, Mandy	Sawkill	trib to Sawkill	Woodstock
78196	xy4204906374061277	0.440160846	No AOP	Us channel turns into pond 15 ft up from inlet	OK	Culvert	44028	Moderate barrier	House 1457	Ganon, Ben	Glasco tpk	Unnamed	Saugerties

Survey_Id	Crossing_Code	Aqua_Pass_Score	AOP	Crossing_Comment	Crossing_Condition	Crossing_Type	Date_Observed	Evaluation	Location_Description	Observer	Road	Stream_Name	Town
79683	xy4197522274014566	0.442427218	Reduced AOP	Very busy road intersection...	OK	Culvert	44077	Moderate barrier	Intersection of 209 and SAWkill	Parmelee, Kiah	Sawkill rd	Unnamed	Ulster
36933	xy4201603974075257	0.443427847	No AOP		OK	Culvert	2016-06-27	Moderate barrier	Sawkill	Wolfson, Mandy	Sawkill	trib to Sawkill	Woodstock
60025	xy4201360974076566	0.444915256	No AOP		OK	Culvert	2018-06-20	Moderate barrier	Right off Zena Road	Johnston, Christopher	Rowe Road	Trib of Saw Kill	Woodstock
36928	xy4201474174073106	0.45539491	Reduced AOP	wetland to wetland	OK	Culvert	2016-06-27	Moderate barrier	Sawkill	Wolfson, Mandy	Sawkill	trib to Sawkill	Woodstock
60399	xy4202756474090636	0.46398821	Reduced AOP	Becomes shallower and faster midway through structure and slows down at outlet	OK	Culvert	2018-06-27	Moderate barrier	On bend past large blue house	Johnston, Christopher	Chestnut Hill Road	Saw Kill	Woodstock
79559	xy4207829673973632	0.465549964	No AOP	Other 2 downstream culvert under nys87	OK	Culvert	44069	Moderate barrier	1196 kings hwy	Parmelee, Kiah	Kings hwy	Unnamed	Saugerties
79560	xy4206415573978072	0.466909488	No AOP		OK	Multiple Culvert	44069	Moderate barrier	House 1071	Parmelee, Kiah	Kings hwy	Unnamed	Saugerties
79560	xy4206415573978072	0.466909488	No AOP		OK	Multiple Culvert	44069	Moderate barrier	House 1071	Parmelee, Kiah	Kings hwy	Unnamed	Saugerties
60335	xy4199735974087670	0.477374851	No AOP		OK	Culvert	2018-06-25	Moderate barrier	Right as you turn onto Max's Place	Johnston, Christopher	Max's Place	Unnamed	Hurley
37095	xy4205018974067884	0.484043316	No AOP		OK	Culvert	2016-07-06	Moderate barrier	glasco tpk	Wolfson, Mandy	Glasco Tpk	unknown	Saugerties
41222	xy4188406074128030	0.494363792	Reduced AOP	odor and algal bloom downstream	OK	Multiple Culvert	2016-09-20	Moderate barrier	at Cole House , from pond	Wolfson, Mandy	Hurley Mountain Road	tributary to Esopus Creek	Marbletown
41222	xy4188406074128030	0.494363792	Reduced AOP	odor and algal bloom downstream	OK	Multiple Culvert	2016-09-20	Moderate barrier	at Cole House , from pond	Wolfson, Mandy	Hurley Mountain Road	tributary to Esopus Creek	Marbletown
49894	xy4164175074189590	0.494647688	No AOP		Poor	Culvert	2017-07-27	Moderate barrier	near Long Ln.	Clark, Johnathan	Albany Post Rd.	unnamed	Shawangunk
77063	xy4210802374050643	0.49545056	No AOP		OK	Culvert	43998	Moderate barrier	Near bear ln	Ganon, Ben	W saugerties rd	Unnamed	Saugerties
60034	xy4176928774477414	0.495928399	No AOP	Clogged with thorny bushes at inlet	OK	Culvert	2018-06-08	Moderate barrier	By House 1207	Johnston, Christopher	Ulster Heights Road	Unnamed	Wawarsing
48880	xy4182481373980496	0.497147068	No AOP		OK	Multiple Culvert	2017-07-18	Moderate barrier	near Frog Hollow Farm	Clark, Johnathan	Old Post Rd.	tributary to Black Creek	Esopus
48880	xy4182481373980496	0.497147068	No AOP		OK	Multiple Culvert	2017-07-18	Moderate barrier	near Frog Hollow Farm	Clark, Johnathan	Old Post Rd.	tributary to Black Creek	Esopus
49890	xy4165094274183718	0.498311336	No AOP		OK	Culvert	2017-07-27	Moderate barrier	near Town of New Paltz border with Shawangunk	Clark, Johnathan	Albany Post Rd.	tributary to Wallkill River	New Paltz
41226	xy4190108074168040	0.49999988	No AOP		OK	Culvert	2016-09-20	Moderate barrier	Atwood	Wolfson, Mandy	Atwood	trib to Esopus	Marbletown
47909	xy4160346573998768	0.49999988	No AOP		OK	Culvert	2017-07-06	Moderate barrier	near intersection with Plattekill Rd.	Clark, Johnathan	Lattintown Rd.	unnamed	Marlborough
48430	xy4160034174015181	0.49999988	No AOP	culvert with severe free fall directly upstream	OK	Culvert	2017-07-11	Moderate barrier	near Hampton Rd.	Clark, Johnathan	Plattekill Rd.	unnamed	Marlborough

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51234	xy4168387574213720	0.49999988	No AOP		OK	Culvert	2017-08-10	Moderate barrier	at house No. 1308	Clark, Johnathan	Bruynswick Rd.	tributary to Wallkill River	Gardiner
51731	xy4166893174295490	0.49999988	No AOP		OK	Culvert	2017-08-15	Moderate barrier	near intersection with Howard Ln.	Clark, Johnathan	Awosting Rd.	Beaver Brook	Shawangunk
59524	xy4183554074446376	0.49999988	No AOP		OK	Culvert	2018-06-14	Moderate barrier	Guard rail on left side going from Shalom Rd to Phil Martin Rd	Johnston, Christopher	Yeagerville Road	Unnamed	Wawarsing
60726	xy4206491574163637	0.49999988	No AOP		OK	Culvert	2018-07-02	Moderate barrier	Immediately after turn onto road	Johnston, Christopher	Church Road	Trib to Saw Kill	Woodstock
77810	xy4190547074218357	0.49999988	No AOP	Owner says floods semi often_x000D_ _x000D_ Other 2 is high erosion upstream right bank_x000D_ Other 3 is high erosion downstream left bank	OK	Culvert	44019	Moderate barrier	House 195	Ganon, Ben	Kripplebush Davis corners rd	Unnamed	Olive
49580	xy4180649974083684	0.506797476	Reduced AOP		OK	Culvert	2017-07-25	Moderate barrier	near Old Canaan Rd., pole No. 142	Clark, Johnathan	Springtown Rd.	tributary to Wallkill River	Rosendale
77125	xy4204694874121944	0.510523758	No AOP	Waterfall upstream	OK	Culvert	43999	Moderate barrier	Near mailbox 31	Ganon, Ben	Lower byrdcliffe rd	Unnamed	Woodstock
77407	xy4204702174034478	0.512994426	No AOP		OK	Culvert	44006	Moderate barrier	Down the hill from 1176 glasco tpk	Ganon, Ben	Glasco tpk	Unnamed	Saugerties
37098	xy4204906374061277	0.513030189	No AOP		OK	Culvert	2016-07-06	Moderate barrier	glasco tpk	Wolfson, Mandy	Glasco Tpk	unknown	Saugerties
60435	xy4203232074092710	0.522077505	No AOP	Dry 10 feet downstream	OK	Culvert	2018-06-27	Moderate barrier	Past Fox Hollow, before sharp bend	Johnston, Christopher	Laura Lane	Unnamed	Woodstock
79047	xy4199930874005222	0.527046088	Reduced AOP	Other 2 high erosion downstream left bank	OK	Culvert	44050	Moderate barrier	House 2235	Ganon, Ben	Sawkill Ruby rd	Unnamed	Ulster
78036	xy4212100374022134	0.527684251	Reduced AOP		OK	Culvert	44025	Moderate barrier	Blue mt and van buskirk	Ganon, Ben	Blue mountain rd	Unnamed	Saugerties
77952	xy4190267174067398	0.532387112	Reduced AOP	No erosion on either side easy access to floodplain on upstream and strong armoring downstream	OK	Culvert	44020	Moderate barrier	House 890	Ganon, Ben	Lucas ave	Unnamed	Hurley
47101	xy4175069073968819	0.538898359	Reduced AOP		OK	Culvert	2017-06-22	Moderate barrier	near John White Rd.	Clark, Johnathan	Riverside Rd.	unnamed	Lloyd
60448	xy4204293474083475	0.543242777	No AOP		OK	Culvert	2018-06-27	Moderate barrier	Near Chicken Joe Road	Johnston, Christopher	Baumgarten Road	Saw Kill	Woodstock
49583	xy4179310174087646	0.545070794	No AOP		OK	Culvert	2017-07-25	Moderate barrier	between Portuese Ln. and Cragswood Rd.	Clark, Johnathan	Springtown Rd.	unnamed	New Paltz
79444	xy4204577074027110	0.548246704	Reduced AOP	Other 2 scour multiple and headwall 3	OK	Culvert	44064	Moderate barrier	House 1066	Parmelee, Kiah	Glasco tpk	Unnamed	Saugerties

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60884	xy4203177074144380	0.549963536	Reduced AOP	Water trickling through debris build up	OK	Culvert	2018-07-03	Moderate barrier	Before turn onto Blue Jay Way	Johnston, Christopher	Broadview Road	Unnamed	Woodstock
79471	xy4210964473963994	0.55126963	Reduced AOP	Other 2 and 3 embankment is a 3	OK	Culvert	44068	Moderate barrier	House 417	Parmelee, Kiah	Malden tpk	Unnamed	Saugerties
76848	xy4205163474104653	0.554309676	Reduced AOP		OK	Culvert	43991	Moderate barrier	Next to house number 90	Ganon, Ben	Rock City rd	Unnamed	Woodstock
41447	xy4208093373971545	0.554713836	No AOP		OK	Culvert	2016-10-13	Moderate barrier	near ramp off thruway	Wolfson, Mandy	King	trib to Beaver Kill	Saugerties
78118	xy4195514474148742	0.560721981	Reduced AOP	Other 2 high erosion us lb. low spotty erosion underneath deep vegetation unable to get clear picture. Other 3 is failing ds armoring.	OK	Culvert	44027	Moderate barrier	Next to house no. 337	Ganon, Ben	Spillway rd	Unnamed	Hurley
79692	xy4197507973999204	0.561964588	Reduced AOP	Very overgrown stream, cutting at us lb wingwall see other3	OK	Culvert	44078	Moderate barrier	Enterprise drive and 209	Parmelee, Kiah	Enterprise dr	Unnamed	Ulster
79682	xy4204302473957726	0.562827225	No AOP	Other 2 where we presume structure is buriedunder the headwall. There is flow but no structure visible under sediment. Other 3 outlet. Can see section of structure under stadia rod in outlet photo.	OK	Culvert	44077	Moderate barrier	House 260	Parmelee, Kiah	Glasco tpk	Unnamed	Saugerties
60013	xy4199838874057424	0.567735768	No AOP	Water flows beneath rocks at stream grade on inlet side	OK	Culvert	2018-06-20	Moderate barrier	House 15	Johnston, Christopher	Shining Path Road	Trib of Saw Kill	Kingston (town)
60360	xy4201415774098136	0.568471305	Reduced AOP		OK	Culvert	2018-06-25	Moderate barrier	Before intersection Nissen Lane	Johnston, Christopher	Tanglewood Road	Trib of Saw Kill	Hurley
60076	xy4164840074310650	0.571716452	Reduced AOP		OK	Culvert	2018-06-19	Moderate barrier	Midway between Redder Road and Benjamin Vankeuren Drive	Johnston, Christopher	Indian Springs Road	Unnamed	Shawangunk
48449	xy4185477673984458	0.571721408	Reduced AOP		OK	Multiple Culvert	2017-07-13	Moderate barrier	near Hellbrook Ln.	Clark, Johnathan	Union Center Rd.	tributary to Black Creek	Esopus
48449	xy4185477673984458	0.571721408	Reduced AOP		OK	Multiple Culvert	2017-07-13	Moderate barrier	near Hellbrook Ln.	Clark, Johnathan	Union Center Rd.	tributary to Black Creek	Esopus
78197	xy4204665774050415	0.57266612	Reduced AOP	Other 2 is high erosion us rb.	OK	Culvert	44028	Moderate barrier	Before Fred short rd going east	Ganon, Ben	Glasco tpk	Unnamed	Saugerties
49582	xy4181555674079840	0.573439585	Reduced AOP		OK	Culvert	2017-07-25	Moderate barrier	south of River Rd.	Clark, Johnathan	Springtown Rd.	unnamed	Rosendale
78267	xy4206158374010757	0.576915027	Reduced AOP	Other 3 high erosion ds lb. other 2 high erosion us lb.	OK	Culvert	44032	Moderate barrier	House 25	Ganon, Ben	Old powder mill rd	Unnamed	Saugerties

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41453	xy4211039074008740	0.581815079	Reduced AOP		OK	Culvert	2016-10-13	Moderate barrier	at house # 135	Wolfson, Mandy	Harry Wells Rd	trib to Beaverkill	Saugerties
36840	xy4202929874084032	0.585077942	No AOP		Unknown	Culvert	2016-06-21	Moderate barrier	Zena	Wolfson, Mandy	Zena	trib to Sawkill	Woodstock
77948	xy4185572474130842	0.588735727	Reduced AOP		OK	Culvert	44020	Moderate barrier	Near SUNY ulster entrance	Ganon, Ben	Cottekill rd	Unnamed	Marbletown
78198	xy4204634074048399	0.592096498	Reduced AOP	Other 2 us lb high erosion other 3 ds rb high erosion	OK	Multiple Culvert	44028	Moderate barrier	Before Fred short rd going west	Ganon, Ben	Glasco tpk	Unnamed	Saugerties
78198	xy4204634074048399	0.592096498	Reduced AOP	Other 2 us lb high erosion other 3 ds rb high erosion	OK	Multiple Culvert	44028	Moderate barrier	Before Fred short rd going west	Ganon, Ben	Glasco tpk	Unnamed	Saugerties
48426	xy4160309473994979	0.597045496	Reduced AOP		OK	Culvert	2017-07-11	Moderate barrier	near Polizzi Dr.	Clark, Johnathan	Plattekill Rd.	unnamed	Marlborough
78193	xy4208105974005561	0.599259577	No AOP	Other 2 is high erosion us rb. Other 3 is high erosion ds rb.	OK	Culvert	44028	Moderate barrier	House 37	Ganon, Ben	Fish creek rd	Unnamed	Saugerties
77944	xy4190277074067287	0.60003669	Reduced AOP	Other 2 is high erosion us lb_x000D_ Ds low erosion can be seen in downstream photo	OK	Culvert	44020	Minor barrier	Heritage Dr intersection	Ganon, Ben	Lucas ave	Unnamed	Hurley
36827	xy4204848174118219	0.60298439	No AOP		OK	Culvert	2016-06-20	Minor barrier	Rock City	Wolfson, Mandy	Rock City	unknown	Woodstock
48423	xy4160465873992153	0.60303414	Reduced AOP		Poor	Culvert	2017-07-11	Minor barrier	near Billesimo Dr.	Clark, Johnathan	Plattekill Rd.	tributary to Lattintown Creek	Marlborough
50774	xy4177814074131010	0.604068681	Reduced AOP	seasonal mountain stream	OK	Culvert	2017-08-01	Minor barrier	at Mohonk NE Trail	Clark, Johnathan	Mountain Rest Rd.	unnamed	New Paltz
48899	xy4181930374026461	0.605138109	Reduced AOP		OK	Culvert	2017-07-18	Minor barrier	near pole No. 165506	Clark, Johnathan	Old Post Rd.	Swarte Kill	Esopus
47906	xy4161011873994940	0.605951762	No AOP	pond immediately downstream	OK	Culvert	2017-07-06	Minor barrier	near Wygant Rd.	Clark, Johnathan	Lattintown Rd.	unnamed	Marlborough
51728	xy4166001974280920	0.610091622	Reduced AOP		OK	Culvert	2017-08-15	Minor barrier	north of Jansen Ln.	Clark, Johnathan	Awosting Rd.	tributary to Dwaar Kill	Shawangunk
36934	xy4214150474006591	0.610327003	Reduced AOP		OK	Culvert	2016-07-01	Minor barrier	Blue Mountain	Wolfson, Mandy	Blue Mountain	unknown	Saugerties
41444	xy4210818173955410	0.611106	Reduced AOP	pipes rotted out	Poor	Multiple Culvert	2016-10-04	Minor barrier	by Thruway rest area access road	Wolfson, Mandy	Malden Tpk	Sawyer Kill	Saugerties
41444	xy4210818173955410	0.611106	Reduced AOP	pipes rotted out	Poor	Multiple Culvert	2016-10-04	Minor barrier	by Thruway rest area access road	Wolfson, Mandy	Malden Tpk	Sawyer Kill	Saugerties
36833	xy4202663074126060	0.612188272	Reduced AOP		OK	Culvert	2016-06-21	Minor barrier	Ohayo Mountain Road	Wolfson, Mandy	Ohayo Mountain Road	unknown	Woodstock
36843	xy4202108074079380	0.612188272	Reduced AOP		OK	Culvert	2016-06-21	Minor barrier	Zena	Wolfson, Mandy	Zena	trib to Sawkill	Woodstock
37075	xy4210802374050643	0.612188272	No AOP		OK	Culvert	2016-07-05	Minor barrier	Saugerties Woodstock road	Wolfson, Mandy	W. Saugerties Woodstock Road	unknown	Saugerties

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61171	xy4201059074423590	0.612188272	Reduced AOP	Fine sediment build up at outlet	OK	Culvert	2018-07-09	Minor barrier	Before Shandaken Rod and Gun Club	Johnston, Christopher	Oliverea Road	Trib to West Branch Neversink River	Shandaken
78414	xy4200004074082170	0.612209106	Reduced AOP	Other 2 usrb low erosion	OK	Culvert	44035	Minor barrier	House 161	Ganon, Ben	W Hurley-Zena rd	Unnamed	Woodstock
60005	xy4198551174032890	0.6199	Reduced AOP	Two man made pipes causing rifts in the middle of the Bridge	OK	Bridge	2018-06-20	Minor barrier	Before Sawkill Firehouse	Johnston, Christopher	Sawkill Road	Saw Kill	Kingston (town)
60015	xy4198851174060970	0.620130279	No AOP	Mud filling 50 percent of culvert	OK	Culvert	2018-06-20	Minor barrier	By House 220	Johnston, Christopher	Morey Hill Road	Unnamed	Woodstock
37382	xy4203177073989827	0.625071086	Reduced AOP	pipe rotted at bottom	Poor	Culvert	2016-07-26	Minor barrier	at Sauer Farm	Wolfson, Mandy	Old King	tributary to Plattekill Creek	Saugerties
51167	xy4168441274190463	0.631100156	Reduced AOP		OK	Culvert	2017-08-08	Minor barrier	near house No. 174	Clark, Johnathan	McKinstry Rd.	unnamed	Gardiner
41396	xy4194251074163550	0.640515126	No AOP		OK	Culvert	2016-09-27	Minor barrier	on Spillway rd	Wolfson, Mandy	Spillway	trib to Esopus	Marbletown
37129	xy4206580374012115	0.641706506	No AOP		OK	Culvert	2016-07-14	Minor barrier	Fish Creek Road	Wolfson, Mandy	Fish Creek Road	Fish Creek Road	Saugerties
60357	xy4201971574102654	0.643244787	Reduced AOP		OK	Culvert	2018-06-25	Minor barrier	By House 15	Johnston, Christopher	Witchtree Road	Trib of Saw Kill	Woodstock
78532	xy4198551174032890	0.6438	No AOP	Other 3 severe free fall caused by pipe covered with cement running through middle of structure. Other 2 high erosion us rb.	OK	Bridge	44039	Minor barrier	Bridge near fire department	Ganon, Ben	Sawkill rd	Saw Kill	Kingston (town)
59987	xy4159586574363025	0.645257295	Reduced AOP		OK	Culvert	2018-06-18	Minor barrier	By House 1040	Johnston, Christopher	Burlingham Road	Tommy Kill	Shawangunk
77814	xy4191093074181730	0.645582785	Reduced AOP	Other 2 high erosion us rb _x000D_ Other 3 high erosion ds lb	OK	Culvert	44019	Minor barrier	At end of man made hill	Ganon, Ben	Atwood rd	Unnamed	Marbletown
77806	xy4191779074209030	0.65019527	Reduced AOP	Other 2 is low erosion us rb	OK	Culvert	44019	Minor barrier	House 474	Ganon, Ben	Atwood rd	Unnamed	Olive
78269	xy4206029174010154	0.65107081	Reduced AOP	Another metal drainage culvert at outlet. Other2 ds rb high erosion	OK	Culvert	44032	Minor barrier	House 39	Ganon, Ben	Old powder mill rd	Unnamed	Saugerties
76921	xy4188106174157382	0.655089835	Reduced AOP		OK	Culvert	43992	Minor barrier	Near mailbox 3962_x000D_ Near mailbox 3962	Ganon, Ben	Atwood rd	Unnamed	Marbletown
51165	xy4167928074181480	0.655972783	Reduced AOP		OK	Culvert	2017-08-08	Minor barrier	between Albany Post Rd. and Burnt Meadows Rd.	Clark, Johnathan	McKinstry Rd.	unnamed	Gardiner
47490	xy4169907474016600	0.659438751	Reduced AOP		OK	Culvert	2017-06-26	Minor barrier	68 Crescent Ln.	Clark, Johnathan	Crescent Ln.	Pancake Hollow Brook	Plattekill
37111	xy4204634074048399	0.663352884	No AOP		OK	Multiple Culvert	2016-07-06	Minor barrier	glasco tpk	Wolfson, Mandy	Glasco Tpk	unknown	Saugerties

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37111	xy4204634074048399	0.663352884	No AOP		OK	Multiple Culvert	2016-07-06	Minor barrier	glasco tpk	Wolfson, Mandy	Glasco Tpk	unknown	Saugerties
41457	xy4199581273962926	0.663643186	Reduced AOP		OK	Culvert	2016-10-25	Minor barrier	past children's annex	Wolfson, Mandy	Kukuk Lane	trib to Hudson	Ulster
64070	xy4201999474133192	0.663900517	Reduced AOP		OK	Culvert	43341	Minor barrier	Next to house 360 on ohayo Mountain Road	Cabanillas, Amanda	CR 41	Little Beaver Kill	Woodstock
41449	xy4211014974004807	0.666409793	Reduced AOP		OK	Culvert	2016-10-13	Minor barrier	at house #171	Wolfson, Mandy	Harry Wells	Beaverkill	Saugerties
36497	xy4205071074137750	0.667164775	Reduced AOP	Stream diverted to road ditch prior to crossing	OK	Culvert	2016-05-31	Minor barrier	Glasco Tpk	Wolfson, Mandy	Glasco Tpk	unknown	Woodstock
37142	xy4204511074024920	0.667280097	Reduced AOP		OK	Culvert	2016-07-19	Minor barrier	glasco tpk	Wolfson, Mandy	Glasco Tpk	unknown	Saugerties
78577	xy4199760874021110	0.669478508	Reduced AOP	Other 2 span barrel 4.	OK	Culvert	44040	Minor barrier	House 269	Ganon, Ben	Halihan hill rd	Unnamed	Kingston (town)
64279	xy4202363474192993	0.672090915	Reduced AOP		OK	Culvert	43347	Minor barrier	At pole 137146	Cabanillas, Amanda	CR 40	Unnamed	Woodstock
76920	xy4190299874107120	0.674055807	Reduced AOP		OK	Culvert	43992	Minor barrier	Next to Davenport Farm stand	Ganon, Ben	Hurley Mountain rd	Unnamed	Marbletown
37103	xy4204665774050415	0.676227506	Reduced AOP		OK	Culvert	2016-07-06	Minor barrier	glasco tpk	Wolfson, Mandy	Glasco Tpk	unknown	Saugerties
62111	xy4197813474519095	0.676263372	No AOP		OK	Culvert	2018-07-09	Minor barrier	Just past White Pond	Johnston, Christopher	Frost Valley Road	Trib to the West Branch Neversink River	Denning
47102	xy4174658673974949	0.676798016	Reduced AOP	excavated pond located on private property immediately downstream	OK	Culvert	2017-06-22	Minor barrier	at No. 472 Liberty Orchards	Clark, Johnathan	Riverside Rd.	unnamed	Lloyd
36837	xy4203550874085820	0.682844192	No AOP		OK	Culvert	2016-06-21	Minor barrier	Zena	Wolfson, Mandy	Zena	trib to Sawkill	Woodstock
41223	xy4185572474130842	0.683416924	Reduced AOP		OK	Culvert	2016-09-20	Minor barrier	at SUNY Ulster	Wolfson, Mandy	Cottekill Road	unknown	Marbletown
51222	xy4169569474207760	0.684246863	Reduced AOP		OK	Culvert	2017-08-10	Minor barrier	near Majestic View Farms	Clark, Johnathan	Bruynswick Rd.	tributary to Wallkill River	Gardiner
76993	xy4197787474091429	0.686594514	no score - missing data	Slight free fall that wouldn?t be there at slightly higher flow. Stream adjacent to road at outlet backflows into structure	OK	Culvert	43994	Minor barrier	Corner of county rd 50 and 51	Ganon, Ben	Rt 28a	Unnamed	Hurley
41475	xy4199381373957584	0.690048551	Reduced AOP		OK	Culvert	2016-10-25	Minor barrier	near Ulster Landing Rd	Wolfson, Mandy	Kukuk Lane	Trib to Hudson	Ulster
41225	xy4188106174157382	0.690951536	Reduced AOP		OK	Culvert	2016-09-20	Minor barrier	by house # 3962	Wolfson, Mandy	Atwood	trib to Esopus	Marbletown
60328	xy4199718074087857	0.691180113	No AOP		OK	Culvert	2018-06-25	Minor barrier	Next to Gun Parts Corporation	Johnston, Christopher	Wlliams Lane	Unnamed	Hurley
47501	xy4169264873991210	0.693171086	Reduced AOP		OK	Culvert	2017-06-29	Minor barrier	near Fieldstone Ct.	Clark, Johnathan	Orchard Rd.	tributary to Twaalfskill Creek	Lloyd

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78378	xy4212022073991138	0.695812722	Reduced AOP	Other 1 high erosion us lb.	OK	Culvert	44034	Minor barrier	Before Riley?s auto repair	Ganon, Ben	Harry wells rd	Unnamed	Saugerties
60387	xy4207984074134279	0.696183642	No AOP	large buildup of boulders midway through structure	OK	Culvert	2018-06-25	Minor barrier	Right after intersection with Keefe Hollow Road	Johnston, Christopher	New Keefe Hollow	Trib of Saw Kill	Woodstock
41221	xy4188759874123251	0.696742026	Reduced AOP		OK	Multiple Culvert	2016-09-08	Minor barrier	before Fording Place	Wolfson, Mandy	Hurley Mountain Road	Stony Creek	Marbletown
41221	xy4188759874123251	0.696742026	Reduced AOP		OK	Multiple Culvert	2016-09-08	Minor barrier	before Fording Place	Wolfson, Mandy	Hurley Mountain Road	Stony Creek	Marbletown
50798	xy4161625074220740	0.701491241	Reduced AOP		OK	Culvert	2017-08-03	Minor barrier	large concrete crossing in wetland area on Bruyn Tpke.	Clark, Johnathan	Bruyn Tpke.	unnamed	Shawangunk
47105	xy4174619273976825	0.705244187	Reduced AOP	dead fish observed near crossing and in structure	OK	Culvert	2017-06-22	Minor barrier	near telephone poll No. 28190	Clark, Johnathan	Riverside Rd.	tributary to Twaalfskill Creek	Lloyd
78026	xy4211932074021615	0.705637872	Reduced AOP	Other 2 is of high erosion ds lb	OK	Culvert	44025	Minor barrier	Near pole 109327	Ganon, Ben	Blue mountain rd	Unnamed	Saugerties
78404	xy4200458974065802	0.709156656	Reduced AOP	Other 2 more upstream no erosion. Drains directly in to SAWkill	OK	Culvert	44035	Minor barrier	Pole nyt26	Ganon, Ben	Sawkill rd	Unnamed	Woodstock
60364	xy4209132174153255	0.712727579	No AOP		OK	Culvert	2018-06-27	Minor barrier	Just past bend	Johnston, Christopher	Hutchin Hill Road	Trib of Saw Kill	Woodstock
78200	xy4205192874072053	0.715247003	Reduced AOP	Long culvert with an outfall draining into the structure on the outlet side before it crosses glasco. Other 2 outfall appx 230 ft from inlet. Downstream photo high erosion left bank. Other 3 shows fencing both on the inlet and outlet.	OK	Culvert	44028	Minor barrier	Glasco and cottontail ln	Ganon, Ben	Glasco tpk	Unnamed	Saugerties
64272	xy4201764274185179	0.71889764	Reduced AOP		OK	Multiple Culvert	43347	Minor barrier	Adjacent to house 545	Cabanillas, Amanda	CR 40	Unnamed	Woodstock
49585	xy4175135674096575	0.720978734	Reduced AOP		OK	Culvert	2017-07-25	Minor barrier	near town park	Clark, Johnathan	Springtown Rd.	unnamed	New Paltz
59056	xy4179912074194462	0.721845289	Reduced AOP		OK	Culvert	2018-06-01	Minor barrier	Before farm	Johnston, Christopher	Lucas Turnpike	Unnamed	Rochester (Ulster)
77647	xy4201474174073106	0.723912518	Reduced AOP	Other 2 low erosion upstream right bank, most erosion in active channel	OK	Culvert	44012	Minor barrier	Mailbox 1675	Ganon, Ben	Sawkill rd	Unnamed	Woodstock

Survey_Id	Crossing_Code	Aqua_Pass_Score	AOP	Crossing_Comment	Crossing_Condition	Crossing_Type	Date_Observed	Evaluation	Location_Description	Observer	Road	Stream_Name	Town
60351	xy4201737074080078	0.727504149	Reduced AOP	Downward sloping at outlet causing increased velocity and tailwater scour pool	OK	Culvert	2018-06-25	Minor barrier	Near intersection with Van Dale Road	Johnston, Christopher	Van De Bogart Road	Trib of Saw Kill	Woodstock
78925	xy4195195874049153	0.729102551	Reduced AOP	Other 2 failed wingwall on inlet side. Other 3 ds rb high erosion	OK	Culvert	44048	Minor barrier	By entrance to baseball field	Ganon, Ben	Hurley Mountain rd	Unnamed	Ulster
37126	xy4204702174034478	0.73373232	Reduced AOP		OK	Culvert	2016-07-14	Minor barrier	glasco tpk	Wolfson, Mandy	Glasco Tpk	unknown	Saugerties
41206	xy4195941073985228	0.733795705	Reduced AOP		OK	Culvert	2016-09-06	Minor barrier	Passed Kohl's	Wolfson, Mandy	Miron Lane	Bear Ghat Kill	Ulster
41404	xy4197787474091429	0.73415556	Reduced AOP		OK	Culvert	2016-09-29	Minor barrier	at intersection with Morgan Hill Rd	Wolfson, Mandy	Rt 28A	unknown	Hurley
77123	xy4204943274118571	0.736978407	Reduced AOP		OK	Culvert	43999	Minor barrier	Near mailbox 2277	Ganon, Ben	Glasco tpk	Unnamed	Woodstock
36831	xy4202977374125285	0.738805906	Reduced AOP		OK	Culvert	2016-06-21	Minor barrier	Ohayo Mountain Road	Wolfson, Mandy	Ohayo Mountain Road	unknown	Woodstock
50779	xy4167913074150929	0.738805906	No AOP	stream tends to flood, dam downstream	OK	Culvert	2017-08-01	Minor barrier	at intersection with Farmer's Turnpike	Clark, Johnathan	Sand Hill Rd.	tributary to Wallkill River	Gardiner
78034	xy4210697974032019	0.73979063	Reduced AOP	Outlet covered in pi	OK	Culvert	44025	Minor barrier	Band camp and w saugerties	Ganon, Ben	W saugerties rd	Unnamed	Saugerties
49876	xy4171562074155780	0.740874631	Reduced AOP		OK	Culvert	2017-07-27	Minor barrier	near Tall Pines Rd.	Clark, Johnathan	Albany Post Rd.	tributary to Wallkill River	New Paltz
78265	xy4207378974011479	0.741056514	Reduced AOP	No erosion either side	OK	Culvert	44032	Minor barrier	House 125	Ganon, Ben	Fish creek rd	Unnamed	Saugerties
60684	xy4204601074121930	0.742366528	Reduced AOP	Rock siding lining downstream on left bank	OK	Culvert	2018-07-02	Minor barrier	Just past house 12	Johnston, Christopher	Bellows Lane	Unnamed	Woodstock
77951	xy4190419574065883	0.744907949	Reduced AOP	Midway through upstream their is a constructed pond_x000D_ Other 2 is high erosion us lb_x000D_ Other 3 is high erosion ds lb	OK	Multiple Culvert	44020	Minor barrier	House 906	Ganon, Ben	Lucas ave	Unnamed	Hurley
77951	xy4190419574065883	0.744907949	Reduced AOP	Midway through upstream their is a constructed pond_x000D_ Other 2 is high erosion us lb_x000D_ Other 3 is high erosion ds lb	OK	Multiple Culvert	44020	Minor barrier	House 906	Ganon, Ben	Lucas ave	Unnamed	Hurley
48447	xy4185633773975798	0.745363698	Reduced AOP	likely only a seasonal stream	OK	Culvert	2017-07-13	Minor barrier	near Kane Rd.	Clark, Johnathan	Union Center Rd.	unnamed	Esopus
37152	xy4204425074011180	0.745964418	Reduced AOP		Poor	Culvert	2016-07-19	Minor barrier	glasco tpk	Wolfson, Mandy	Glasco Tpk	unknown	Saugerties

Survey_Id	Crossing_Code	Aqua_Pass_Score	AOP	Crossing_Comment	Crossing_Condition	Crossing_Type	Date_Observed	Evaluation	Location_Description	Observer	Road	Stream_Name	Town
62899	xy4195709074311724	0.747638602	No AOP	Slight deterioration, outlet severely clogged with debris	OK	Culvert	2018-07-30	Minor barrier	On bend after beige house	Johnston, Christopher	Watson Hollow Road	Trib to Bush Kill	Olive
60876	xy4204307074140820	0.748760015	Reduced AOP	Metal pipe stuck in middle of outlet	OK	Culvert	2018-07-03	Minor barrier	About 100 yards past Jackson Lane	Johnston, Christopher	Ricks Road	Unnamed	Woodstock
48444	xy4187167073977260	0.74931492	Reduced AOP		OK	Culvert	2017-07-13	Minor barrier	near Rodmans Ln.	Clark, Johnathan	Ulster Ave.	unnamed	Esopus
76847	xy4205163474104653	0.753773772	Reduced AOP	Failing temp wall jersey barrier left bank	Poor	Culvert	43991	Minor barrier	2091 glasco turnpike	Ganon, Ben	Glasco tpk	Unnamed	Woodstock
60011	xy4197581274017015	0.753792043	Reduced AOP		OK	Culvert	2018-06-20	Minor barrier	By House 532	Johnston, Christopher	Lem Boice Lane	Unnamed	Ulster
47088	xy4172847073969644	0.754697566	Reduced AOP		OK	Culvert	2017-06-20	Minor barrier	Twaalfskill Creek crossing New Paltz R.d	Clark, Johnathan	New Paltz Rd.	Twaalfskill Creek	Lloyd
77811	xy4190510074219470	0.756323229	Reduced AOP	Other 2 is high erosion upstream right bank other 3 is high erosion ds left bank slash embankment	OK	Culvert	44019	Minor barrier	House 208	Ganon, Ben	Kripplebu sh Davis corners rd	Unnamed	Olive
59991	xy4166699874386307	0.75735008	Reduced AOP		OK	Culvert	2018-06-18	Minor barrier	By House 316 and Driveway with large rock wall	Johnston, Christopher	Cragsmoo re	Unnamed	Wawarsing
48454	xy4185838774003447	0.758460701	Reduced AOP		OK	Multiple Culvert	2017-07-13	Minor barrier	near Rose Ln.	Clark, Johnathan	Union Center Rd.	tributary to Black Creek	Esopus
48454	xy4185838774003447	0.758460701	Reduced AOP		OK	Multiple Culvert	2017-07-13	Minor barrier	near Rose Ln.	Clark, Johnathan	Union Center Rd.	tributary to Black Creek	Esopus
47503	xy4168201573992642	0.762539139	Reduced AOP		OK	Culvert	2017-06-29	Minor barrier	near Bailey's Gap Rd.	Clark, Johnathan	Milton Cross Rd.	unnamed	Marlboroug h
51219	xy4173869074166630	0.765194044	Reduced AOP		OK	Culvert	2017-08-10	Minor barrier	between Sparkling Ridge Rd. and Hasbrouck Rd.	Clark, Johnathan	Rt. 299	unnamed	Gardiner
47489	xy4171119974050076	0.765969011	Reduced AOP		OK	Culvert	2017-06-26	Minor barrier	near Station Rd.	Clark, Johnathan	South St.	Black Creek	Lloyd
62103	xy4198066574516106	0.768057474	Reduced AOP	Large build up of debris in both culverts causing blockage	OK	Multiple Culvert	2018-07-09	Minor barrier	In between two enclosed horse fields	Johnston, Christopher	Frost Valley Road	Trib to West Branch Neversink River	Denning
62103	xy4198066574516106	0.768057474	Reduced AOP	Large build up of debris in both culverts causing blockage	OK	Multiple Culvert	2018-07-09	Minor barrier	In between two enclosed horse fields	Johnston, Christopher	Frost Valley Road	Trib to West Branch Neversink River	Denning
78266	xy4206580374012115	0.768249741	Reduced AOP		OK	Culvert	44032	Minor barrier	House 285	Ganon, Ben	Fish creek rd	Unnamed	Saugerties
61449	xy4202926674087713	0.770018396	Reduced AOP		OK	Culvert	2018-06-25	Minor barrier	Just past large open field	Johnston, Christopher	Chestnut Hill Road	Trib to Saw Kill	Woodstock

Survey_Id	Crossing_Code	Aqua_Pass_Score	AOP	Crossing_Comment	Crossing_Condition	Crossing_Type	Date_Observed	Evaluation	Location_Description	Observer	Road	Stream_Name	Town
64523	xy4202735274245176	0.772930572	Reduced AOP	Stream channelized to a 2 to3 ft tall low head dam 20 yds downstream of outlet see downstream photo. Concrete bed degrading severely between crossing and dam	OK	Culvert	43354	Minor barrier	Just past fire dept sign 1096	Cabanillas, Amanda	CR 40	Unnamed	Woodstock
37138	xy4204577074027110	0.773293811	No AOP		OK	Culvert	2016-07-19	Minor barrier	glasco tpk	Wolfson, Mandy	Glasco Tpk	unknown	Saugerties
51221	xy4169756974197776	0.773355074	Reduced AOP		OK	Multiple Culvert	2017-08-10	Minor barrier	near intersection with Midway Park Rd.	Clark, Johnathan	Bruynswick Rd.	Mara Kill	Gardiner
51221	xy4169756974197776	0.773355074	Reduced AOP		OK	Multiple Culvert	2017-08-10	Minor barrier	near intersection with Midway Park Rd.	Clark, Johnathan	Bruynswick Rd.	Mara Kill	Gardiner
48694	xy4187513573953926	0.780137397	Reduced AOP		OK	Culvert	2017-07-17	Minor barrier	near house No. 208	Clark, Johnathan	River Rd.	unnamed	Esopus
49891	xy4164629074185690	0.780789375	Reduced AOP		OK	Culvert	2017-07-27	Minor barrier	near stables	Clark, Johnathan	Albany Post Rd.	unnamed	Shawangunk
37149	xy4204504074012950	0.781380927	Reduced AOP		OK	Culvert	2016-07-19	Minor barrier	glacso tpk	Wolfson, Mandy	Glasco Tpk	unknown	Saugerties
47082	xy4173273273995076	0.782124393	Full AOP		OK	Bridge	2017-06-20	Minor barrier	bridge over Black Creek on New Paltz Rd.	Clark, Johnathan	New Paltz Rd.	Black Creek	Lloyd
60285	xy4201305074096694	0.789645702	No AOP	Rock walls within the structure crumbling and blocking passage	Poor	Bridge	2018-06-25	Minor barrier	Just past intersection with Nissen Court	Johnston, Christopher	Nissen Lane	Unnamed	Hurley
48429	xy4159658174001675	0.789852299	Full AOP		OK	Culvert	2017-07-11	Minor barrier	near private road	Clark, Johnathan	Lattintown Rd.	unnamed	Marlborough
41437	xy4210964473963994	0.791274495	Reduced AOP	other picture is downstream a few days later. stream appears to be moved and rechanneled.	OK	Culvert	2016-10-04	Minor barrier	at # 410	Wolfson, Mandy	Malden Tpk	Sawyer Kill	Saugerties
60022	xy4201807474075587	0.792420931	Full AOP		OK	Bridge	2018-06-20	Minor barrier	Before large field overlooking mountain	Johnston, Christopher	John Joy Road	Saw Kill	Woodstock
59174	xy4180868174306538	0.793559477	No AOP		OK	Culvert	2018-06-04	Minor barrier	Just South of sharp bend in road	Johnston, Christopher	Samsonville Road	Mill Brook	Rochester (Ulster)
47504	xy4166612974000976	0.798175498	Reduced AOP		OK	Culvert	2017-06-29	Minor barrier	near house No. 406	Clark, Johnathan	Milton Tpke.	Tributary to Lattintown Creek	Marlborough
60310	xy4203756174084620	0.798561236	Full AOP		OK	Multiple Culvert	2018-06-25	Minor barrier	Next to intersection Fontyne Kill Road	Johnston, Christopher	Gitnick Road	Trib of Saw Kill	Woodstock
60310	xy4203756174084620	0.798561236	Full AOP		OK	Multiple Culvert	2018-06-25	Minor barrier	Next to intersection Fontyne Kill Road	Johnston, Christopher	Gitnick Road	Trib of Saw Kill	Woodstock
60009	xy4197536274018222	0.801051052	Reduced AOP		New	Culvert	2018-06-20	Insignificant barrier	End of Lem Boice Lane before last house	Johnston, Christopher	Lem Boice Lane	Unnamed	Ulster

Survey_Id	Crossing_Code	Aqua_Pass_Score	AOP	Crossing_Comment	Crossing_Condition	Crossing_Type	Date_Observed	Evaluation	Location_Description	Observer	Road	Stream_Name	Town
60030	xy4175199274442104	0.80280893	Reduced AOP		OK	Culvert	2018-06-08	Insignificant barrier	Near House 722	Johnston, Christopher	Ulster Hights Road	Unnamed	Wawarsing
77020	xy4203762474085436	0.803	Full AOP		OK	Bridge	43997	Insignificant barrier	W Hurley Zena rd and gitnick	Ganon, Ben	W Hurley-zena rd	Saw Kill	Woodstock
62914	xy4194232674325734	0.806027179	Reduced AOP		OK	Culvert	2018-07-30	Insignificant barrier	Where river comes close to road	Johnston, Christopher	Watson Hollow Road	Trib to Bush Kill	Olive
47089	xy4172462873967807	0.806571601	Reduced AOP		OK	Culvert	2017-06-20	Insignificant barrier	near Phillips Ave.	Clark, Johnathan	New Paltz Rd.	Twaalfskill Creek	Lloyd
41480	xy4201335673953564	0.806954464	Reduced AOP		OK	Culvert	2016-10-25	Insignificant barrier	near Flatbush Camp Rd (Turkey Point)	Wolfson, Mandy	Ulster Landing Rd	trib to Hudson	Saugerties
47090	xy4172329973966147	0.809631944	Reduced AOP		OK	Culvert	2017-06-20	Insignificant barrier	near North Rd.	Clark, Johnathan	New Paltz Rd.	Twaalfskill Creek	Lloyd
41393	xy4194036074163850	0.810858165	Reduced AOP		OK	Culvert	2016-09-27	Insignificant barrier	on Spillway rd	Wolfson, Mandy	Spillway Rd	trib to Esopus	Marbletown
41224	xy4185170174145217	0.811827237	Reduced AOP	algae filled pond upstream	OK	Culvert	2016-09-20	Insignificant barrier	at house #3444	Wolfson, Mandy	Cooper St (Rt 213)	trib to Esopus	Marbletown
60723	xy4206048474160202	0.814111002	Reduced AOP		Poor	Multiple Culvert	2018-07-02	Insignificant barrier	Just off intersection with 212	Johnston, Christopher	Reynolds Lane	Trib to Saw Kill	Woodstock
60723	xy4206048474160202	0.814111002	Reduced AOP		Poor	Multiple Culvert	2018-07-02	Insignificant barrier	Just off intersection with 212	Johnston, Christopher	Reynolds Lane	Trib to Saw Kill	Woodstock
76966	xy4204055574002680	0.814955769	Full AOP		OK	Bridge	43993	Insignificant barrier	County bridge over plattekill	Ganon, Ben	Glasco tpk	Plattekill Creek	Saugerties
78410	xy4199855674044257	0.820191665	Reduced AOP	Other2 uslb high erosion. Drains directly in to SAWkill	OK	Bridge	44035	Insignificant barrier	Near SAWkill rd and old ballpark rd	Ganon, Ben	Sawkill rd	Unnamed	Kingston (town)
59074	xy4182180674155132	0.820876631	Reduced AOP		OK	Bridge	2018-06-01	Insignificant barrier	Near Stone House with green fence	Johnston, Christopher	Lucas Avenue	Unnamed	Marbletown
41455	xy4204304073957740	0.820933165	no score - missing data		OK	Culvert	2016-10-25	Insignificant barrier	at field	Wolfson, Mandy	Glasco Tpk	trib to Hudson	Saugerties
62898	xy4196633674303244	0.822034441	Full AOP	About a foot of substrate on bottom of culvert	OK	Culvert	2018-07-30	Insignificant barrier	Next to intersection with Every Road	Johnston, Christopher	Watson Hollow Road	Trib to Bush Kill	Olive
60892	xy4204114774135453	0.822635072	Reduced AOP	Water flows from a large pond upstream	OK	Culvert	2018-07-03	Insignificant barrier	Next to large wooden barn	Johnston, Christopher	Lasher Road	Unnamed	Woodstock
47086	xy4173022773970971	0.823117001	Reduced AOP		OK	Culvert	2017-06-20	Insignificant barrier	near Upper Grand St.	Clark, Johnathan	New Paltz Rd.	tributary of Twaalfskill Creek	Lloyd
36936	xy4212697074020660	0.823410893	Reduced AOP		OK	Culvert	2016-07-01	Insignificant barrier	Blue Mountain	Wolfson, Mandy	Blue Mountain	trib to Saxton Creek	Saugerties
36936	xy4212697074020660	0.823410893	Reduced AOP		OK	Culvert	2016-07-01	Insignificant barrier	Blue Mountain	Wolfson, Mandy	Blue Mountain	trib to Saxton Creek	Saugerties

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60317	xy4203654674111310	0.823582747	Reduced AOP	Water pooled in structure, not moving	OK	Culvert	2018-06-25	Insignificant barrier	Just off West Hurley Road	Johnston, Christopher	Millstream Road	Trib of Saw Kill	Woodstock
60353	xy4201318374089885	0.825840092	Reduced AOP	Second dry culvert located well above stream	Poor	Culvert	2018-06-25	Insignificant barrier	By wooden guard rails	Johnston, Christopher	Seaton Lane	Trib of Saw Kill	Woodstock
78199	xy4204618274044769	0.82632698	Full AOP	Unable to get active channel because of barbed wire fencing. Upstream mostly marsh.	OK	Bridge	44028	Insignificant barrier	Near 429 Phillips rd	Ganon, Ben	Glasco tpk	Unnamed	Saugerties
48432	xy4159517474022798	0.827315832	Reduced AOP		OK	Multiple Culvert	2017-07-11	Insignificant barrier	near Miki Ln.	Clark, Johnathan	Plattekill Rd.	unnamed	Marlborough
48432	xy4159517474022798	0.827315832	Reduced AOP		OK	Multiple Culvert	2017-07-11	Insignificant barrier	near Miki Ln.	Clark, Johnathan	Plattekill Rd.	unnamed	Marlborough
37343	xy4206415573978072	0.829799027	Reduced AOP		OK	Multiple Culvert	2016-07-20	Insignificant barrier	king's hwy	Wolfson, Mandy	Old King	Mudder Kill	Saugerties
37343	xy4206415573978072	0.829799027	Reduced AOP		OK	Multiple Culvert	2016-07-20	Insignificant barrier	king's hwy	Wolfson, Mandy	Old King	Mudder Kill	Saugerties
36506	xy4205163474104653	0.829836877	Reduced AOP	rock dam about 50 ft upstream	OK	Culvert	2016-06-01	Insignificant barrier	glasco tpk	Wolfson, Mandy	Glasco Tpk	unknown	Woodstock
62138	xy4197270074527756	0.8307714	Reduced AOP		OK	Culvert	2018-07-10	Insignificant barrier	0.5 miles after bend	Johnston, Christopher	Frost Valley Road	Trib to West Branch Neversink River	Denning
41392	xy4190510074219470	0.833999822	Reduced AOP		OK	Culvert	2016-09-27	Insignificant barrier	west of Vly Rd	Wolfson, Mandy	Krumville	unknown	Olive
77946	xy4189416074075339	0.836139796	Reduced AOP	Other 2 high erosion us lb_x000D_ Other 3 high erosion ds lb	OK	Culvert	44020	Insignificant barrier	House 1095	Ganon, Ben	Lucas ave	Unnamed	Hurley
77676	xy4212697074020660	0.837350929	Reduced AOP	Could not get picture of high erosion because of snake presence	OK	Multiple Culvert	44013	Insignificant barrier	House 910	Ganon, Ben	Blue mountain rd	Unnamed	Saugerties
77676	xy4212697074020660	0.837350929	Reduced AOP	Could not get picture of high erosion because of snake presence	OK	Multiple Culvert	44013	Insignificant barrier	House 910	Ganon, Ben	Blue mountain rd	Unnamed	Saugerties
77940	xy4193073674075598	0.839	Full AOP	Other 2 failing armoring with high erosion us rb _x000D_ Other 3 is continuous high erosion ds rb	OK	Bridge	44020	Insignificant barrier	Bridge before intersect with Hurley mountain rd	Ganon, Ben	Wynkoop rd	Unnamed	Hurley
51724	xy4165438274272555	0.841392893	Reduced AOP		OK	Culvert	2017-08-15	Insignificant barrier	south of Bryant Ln.	Clark, Johnathan	Awosting Rd.	unnamed	Shawangunk
62163	xy4196763974532815	0.851661589	Reduced AOP	Water slows down going through culvert	OK	Culvert	2018-07-10	Insignificant barrier	Just past 40 mph speed limit sign	Johnston, Christopher	Frost Valley Road	Unnamed	Denning
60029	xy4173298774417949	0.851699195	Reduced AOP		Poor	Culvert	2018-06-08	Insignificant barrier	By House 300	Johnston, Christopher	Ulster Heights Road	Unnamed	Wawarsing

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36939	xy4211932074021615	0.852702884	Reduced AOP	stoned lined channel at inlet. Foam at outlet, outlet not aligned with stream	OK	Culvert	2016-07-05	Insignificant barrier	Blue Mountain	Wolfson, Mandy	Blue Mountain	trib to Plattekill	Saugerties
77812	xy4188759874123251	0.852721124	Reduced AOP	Other 2 high erosion us lb_x000D_ Can not access downstream for erosion pic but cut continuous erosion on right bank	OK	Multiple Culvert	44019	Insignificant barrier	House 2377	Ganon, Ben	Hurley Mountain rd	Stony Creek	Marbletown
77812	xy4188759874123251	0.852721124	Reduced AOP	Other 2 high erosion us lb_x000D_ Can not access downstream for erosion pic but cut continuous erosion on right bank	OK	Multiple Culvert	44019	Insignificant barrier	House 2377	Ganon, Ben	Hurley Mountain rd	Stony Creek	Marbletown
77126	xy4204655374119667	0.853668234	Reduced AOP		OK	Bridge	43999	Insignificant barrier	Before red barn	Ganon, Ben	Lower byrdcliffe rd	Unnamed	Woodstock
77016	xy4205434774085094	0.854219962	Full AOP	Couldn?t log gps points on Trimble because of low amount of satellites.	OK	Bridge	43997	Insignificant barrier	Next to house no.1872	Ganon, Ben	Glasco tpk	Unnamed	Woodstock
77950	xy4188406074128030	0.855632208	Reduced AOP	Unable to measure active channel because upstream is a pond	OK	Multiple Culvert	44020	Insignificant barrier	Ponds at end of corn field	Ganon, Ben	Hurley Mountain rd	Unnamed	Marbletown
77950	xy4188406074128030	0.855632208	Reduced AOP	Unable to measure active channel because upstream is a pond	OK	Multiple Culvert	44020	Insignificant barrier	Ponds at end of corn field	Ganon, Ben	Hurley Mountain rd	Unnamed	Marbletown
60653	xy4204309274118732	0.857797374	Reduced AOP	Downstream is against a building's foundation	OK	Culvert	2018-07-02	Insignificant barrier	Running right behind Lotus Fine Arts store just as you turn onto the road	Johnston, Christopher	Mountain View Avenue	Tannery Brook	Woodstock
60323	xy4200534874084353	0.861288465	Reduced AOP		OK	Culvert	2018-06-25	Insignificant barrier	At end of road by brown barn	Johnston, Christopher	Olde Zena Lane	Unnamed	Woodstock
60359	xy4201828374098366	0.861292153	Full AOP		OK	Culvert	2018-06-25	Insignificant barrier	Right after turn onto street	Johnston, Christopher	Tanglewood Road	Trib of Saw Kill	Hurley
60688	xy4204623574121274	0.864589374	Reduced AOP	Stone walls lining downstream both sides	OK	Culvert	2018-07-02	Insignificant barrier	Just past House 8	Johnston, Christopher	Bellows Lane	Trib of Tannery Brook	Woodstock
36849	xy4201874674078318	0.865565902	Full AOP	roadfill edge at top of culvert damaged	OK	Culvert	2016-06-21	Insignificant barrier	zena	Wolfson, Mandy	Zena	trib to Sawkill	Woodstock
77641	xy4201874674078318	0.867851595	Full AOP	Other 2 high erosion upstream left bank_x000D_ Other 3 high erosion downstream where it meets the SAW kill	OK	Bridge	44012	Insignificant barrier	House 537	Ganon, Ben	Zena rd	Unnamed	Woodstock

Survey_Id	Crossing_Code	Aqua_Pass_Score	AOP	Crossing_Comment	Crossing_Condition	Crossing_Type	Date_Observed	Evaluation	Location_Description	Observer	Road	Stream_Name	Town
62900	xy4195690074311970	0.86944468	Reduced AOP	Two small waterfalls leading to inlet	OK	Culvert	2018-07-30	Insignificant barrier	Before House 482	Johnston, Christopher	Watso Hollow Road	Trib to Bush Kill	Olive
36917	xy4197734474014120	0.870460228	no score - missing data		OK	Culvert	2016-06-22	Insignificant barrier	Sawkill	Wolfson, Mandy	Sawkill	trib to Sawkill	Ulster
36917	xy4197734474014120	0.870460228	no score - missing data		OK	Culvert	2016-06-22	Insignificant barrier	Sawkill	Wolfson, Mandy	Sawkill	trib to Sawkill	Ulster
60878	xy4203621674155727	0.870551903	Full AOP		OK	Culvert	2018-07-03	Insignificant barrier	Next to Whitetail Drive	Johnston, Christopher	West Ohayo Mountain Road	Unnamed	Woodstock
60001	xy4160722874339753	0.874	Full AOP		OK	Bridge	2018-06-18	Insignificant barrier	House 1377	Johnston, Christopher	Burlingham Road	Verkeerder Kill	Shawangunk
78033	xy4211224074045884	0.874	Full AOP	Other 2High erosion downstream left bank	OK	Bridge	44025	Insignificant barrier	Bridge at beginning of Burnett rd	Ganon, Ben	Burnett rd	Plattekill Creek	Saugerties
78719	xy4210430874018532	0.874	Full AOP	Other 3 high erosion ds lb. other 2 is span barrel 3 with significant rust and deterioration.	OK	Bridge	44041	Insignificant barrier	Stonegate farm	Ganon, Ben	W saugerties rd	Plattekill Creek	Saugerties
50781	xy4166307774161018	0.880423505	Reduced AOP		OK	Culvert	2017-08-01	Insignificant barrier	south of Marabac Rd.	Clark, Johnathan	Sand Hill Rd.	tributary to Wallkill River	Gardiner
41401	xy4195514474148742	0.8827834	Reduced AOP		OK	Culvert	2016-09-27	Insignificant barrier	east of Baker Rd	Wolfson, Mandy	Spillway Rd	unknown	Hurley
59544	xy4174188974524689	0.892642937	Reduced AOP		OK	Culvert	2018-06-14	Insignificant barrier	Just off State Highway	Johnston, Christopher	Tamarack Road	Unnamed	Wawarsing
77124	xy4204923174117501	0.893176666	Reduced AOP		OK	Culvert	43999	Insignificant barrier	Near mailbox 2260	Ganon, Ben	Glasco tpk	Unnamed	Woodstock
61453	xy4198586474505270	0.893949601	Reduced AOP	stream crosses into horse field	OK	Bridge	2018-07-09	Insignificant barrier	Near Frost Valley YMCA sign	Johnston, Christopher	Frost Valley Road	Trib to Catskill State Park Ponds	Denning
62901	xy4195601074312470	0.894751661	Reduced AOP	Small waterfall upstream	OK	Culvert	2018-07-30	Insignificant barrier	By House 498	Johnston, Christopher	Watson Hollow Road	Trib to Bush Kill	Olive
77943	xy4192564974068420	0.895799411	No AOP	Other 2 high erosion us rb. Other 3 is high erosion ds lb.	OK	Bridge	44020	Insignificant barrier	By abc pools	Ganon, Ben	Old rt 209	Unnamed	Hurley
47902	xy4161926273991333	0.896556387	Full AOP		OK	Bridge	2017-07-06	Insignificant barrier	between Lattintown Rd. and Western Ave.	Clark, Johnathan	Ridge Rd.	Lattintown Creek	Marlborough
77935	xy4213649874013310	0.897676308	Full AOP	Other 2 is of high erosion on ds lb	OK	Culvert	44021	Insignificant barrier	In large open field	Ganon, Ben	Blue mountain rd	Unnamed	Saugerties
47110	xy4172293574009654	0.897709769	Full AOP	large culvert immediately upstream, empties into dammed pond	OK	Bridge	2017-06-22	Insignificant barrier	near Rose Ln.	Clark, Johnathan	Pancake Hollow Rd.	tributary to Black Creek	Lloyd
59062	xy4179587974201566	0.898835672	Full AOP		OK	Culvert	2018-06-01	Insignificant barrier	By Private Road Rondout Lake	Johnston, Christopher	Lucas Turnpike	Unnamed	Rochester (Ulster)

Survey_Id	Crossing_Code	Aqua_Pass_Score	AOP	Crossing_Comment	Crossing_Condition	Crossing_Type	Date_Observed	Evaluation	Location_Description	Observer	Road	Stream_Name	Town
60347	xy4201955774099549	0.900545883	Reduced AOP		OK	Culvert	2018-06-25	Insignificant barrier	By House 40	Johnston, Christopher	Witchtree Road	Trib of Saw Kill	Woodstock
60650	xy4204180274109175	0.901927056	Full AOP	Dry passage on both sides with pools of water forming near sides of structure, Shallower at outlet	OK	Bridge	2018-07-02	Insignificant barrier	By Woodstock Commons	Johnston, Christopher	Leslie's Way	Trib of Saw Kill	Woodstock
47888	xy4162443173993254	0.902946829	Reduced AOP		OK	Culvert	2017-07-06	Insignificant barrier	near pole No. 16291	Clark, Johnathan	Lattintown Rd.	tributary to Lattintown Creek	Marlborough
60027	xy4201128174079274	0.90307789	Reduced AOP		OK	Culvert	2018-06-20	Insignificant barrier	Near white house driveway	Johnston, Christopher	Sherman Road	Unnamed	Woodstock
78844	xy4210765073949620	0.903561334	Reduced AOP	Other 2 high erosion us lb. other 3 blockage us of fallen fence. Deep pool of water in structure.	OK	Bridge	44046	Insignificant barrier	House 251	Ganon, Ben	Malden tpk	SAWyer kill	Saugerties
48866	xy4182652673968899	0.90568	Full AOP	bridge crosses wetland, severe free fall downstream	OK	Bridge	2017-07-18	Insignificant barrier	near railroad crossing	Clark, Johnathan	Old Post Rd.	Black Creek	Esopus
60875	xy4204598774140583	0.907936668	Reduced AOP	Dry streambed	OK	Culvert	2018-07-03	Insignificant barrier	On guardrail bend past House 71	Johnston, Christopher	Ricks Road	Unnamed	Woodstock
77933	xy4213187674017549	0.908766619	Full AOP		OK	Bridge	44021	Insignificant barrier	High erosion us and ds in inaccessible areas	Ganon, Ben	Blue mountain rd	Lucas Kill	Saugerties
41210	xy4192564974068420	0.909657719	Full AOP		New	Bridge	2016-09-08	Insignificant barrier	at box #119	Wolfson, Mandy	Old 209	trib to Esopus	Hurley
78268	xy4206105674013029	0.91	Full AOP		OK	Bridge	44032	Insignificant barrier	House 366, bridge over plattekill	Ganon, Ben	Fish creek rd	Plattekill Creek	Saugerties
79259	xy4201985173996660	0.91	Full AOP	Other 2 abutments 4	OK	Bridge	44057	Insignificant barrier	House 310	Parmelee, Kiah	Old kings hwy	Plattekill Creek	Ulster
77167	xy4203708974118818	0.910989011	Full AOP		OK	Bridge	44000	Insignificant barrier	Near intersection of millstream rd	Ganon, Ben	Tannery brook rd	Saw Kill	Woodstock
48417	xy4161015773982710	0.911756387	Full AOP		OK	Culvert	2017-07-11	Insignificant barrier	near intersection with Plattekill Rd.	Clark, Johnathan	Western Ave.	Lattintown Creek	Marlborough
62249	xy4203422774702499	0.913561334	Full AOP		OK	Bridge	2018-07-16	Insignificant barrier	Bridge with guardrails near 10 mph sign	Johnston, Christopher	Alder Creek Road	Alder Creek	Hardenburgh
62168	xy4195835374544161	0.914823871	Reduced AOP	Very muddy swamp land	OK	Culvert	2018-07-10	Insignificant barrier	Just after driveway of two brown cabins with red roofs	Johnston, Christopher	Frost Valley Road	Trib to West Branch Neversink River	Denning
62211	xy4195610174548309	0.917995775	Reduced AOP	Flows into West Branch Neversink River	OK	Bridge	2018-07-10	Insignificant barrier	Bridge with guard rails and yellow signs	Johnston, Christopher	Frost Valley Road	Flat Brook	Denning
36935	xy4213649874013310	0.920136553	Reduced AOP	upstream bank mowed, no buffer	OK	Culvert	2016-07-01	Insignificant barrier	Blue Mountain	Wolfson, Mandy	Blue Mountain	Saxton Creek	Saugerties
47845	xy4164578374003878	0.925930811	Full AOP		OK	Culvert	2017-07-06	Insignificant barrier	north of Old Indian Rd.	Clark, Johnathan	Lattintown Rd.	Lattintown Creek	Marlborough
41230	xy4191779074209030	0.926305052	Reduced AOP		OK	Culvert	2016-09-22	Insignificant barrier	atwood	Wolfson, Mandy	Atwood/213	trib to Esopus	Marbletown

Survey_Id	Crossing_Code	Aqua_Pass_Score	AOP	Crossing_Comment	Crossing_Condition	Crossing_Type	Date_Observed	Evaluation	Location_Description	Observer	Road	Stream_Name	Town
59171	xy4180688774304958	0.926441121	Full AOP		OK	Culvert	2018-06-04	Insignificant barrier	Intersection with Rochester Court	Johnston, Christopher	Samsonville Road	Mill Brook	Rochester (Ulster)
41212	xy4193073674075598	0.929	Full AOP		OK	Bridge	2016-09-08	Insignificant barrier	near Evergreen Lane	Wolfson, Mandy	Wynkoop	Englishmans Creek	Hurley
41204	xy4196499473969874	0.929298483	Full AOP		OK	Culvert	2016-10-25	Insignificant barrier	Ulster Landing	Wolfson, Mandy	Ulster Landing Road	unknown	Ulster
36822	xy4204694874121944	0.931021884	Reduced AOP		OK	Culvert	2016-06-20	Insignificant barrier	Lower Byrdcliff	Wolfson, Mandy	Lower Byrdcliff	unknown	Woodstock
41229	xy4191093074181730	0.931513205	Reduced AOP		OK	Culvert	2016-09-22	Insignificant barrier	at aqueduct	Wolfson, Mandy	Atwood	trib to Esopus	Marbletown
62229	xy4194743974572436	0.933929392	Reduced AOP	2 streams converge near inlet	OK	Bridge	2018-07-10	Insignificant barrier	Bridge with guard rails before mailbox 922	Johnston, Christopher	Frost Valley Road	Trib to West Branch Neversink River	Denning
36825	xy4204655374119667	0.934160286	Reduced AOP		OK	Culvert	2016-06-20	Insignificant barrier	Lower Byrdcliff	Wolfson, Mandy	Lower Byrdcliff	unknown	Woodstock
60054	xy4162594474308357	0.935404101	Full AOP		OK	Bridge	2018-06-19	Insignificant barrier	By House 3251	Johnston, Christopher	New Prospect Road	Unnamed	Shawangunk
37119	xy4204618274044769	0.93648	Full AOP	from wetland?	OK	Bridge	2016-07-14	Insignificant barrier	glasco tpk	Wolfson, Mandy	Glasco Tpk	unknown	Saugerties
51168	xy4168292074205430	0.937608209	Full AOP		OK	Culvert	2017-08-08	Insignificant barrier	near house No. 408	Clark, Johnathan	McKinstry Rd.	unamed	Gardiner
60668	xy4204255074118580	0.938126923	Reduced AOP		OK	Culvert	2018-07-02	Insignificant barrier	Intersection leading into municipal parking lot	Johnston, Christopher	Off Rock City Road	Tannery Brook	Woodstock
51242	xy4166772574239246	0.938488794	Full AOP		OK	Culvert	2017-08-10	Insignificant barrier	near Saddleback Ridge Rd.	Clark, Johnathan	Tillson Lake Rd.	tributary to Wallkill River	Gardiner
51726	xy4165749074279330	0.939268437	Full AOP		OK	Bridge	2017-08-15	Insignificant barrier	at intersection with Jansen Rd. and Vetter Ln.	Clark, Johnathan	Awosting Rd.	Dwaar Kill	Shawangunk
51725	xy4165688174277663	0.940585295	Full AOP		OK	Bridge	2017-08-15	Insignificant barrier	near Decker Rd.	Clark, Johnathan	Awosting Rd.	Dwaar Kill	Shawangunk
78031	xy4211534474055714	0.9408	Full AOP	Other 2. Low erosion upstream right bank other 3 downstream left bank high erosion	New	Bridge	44025	Insignificant barrier	Intersection of Becker and creekside	Ganon, Ben	Becker rd	Plattekill Creek	Saugerties
41219	xy4191592074094080	0.942466462	Reduced AOP	dry creek bed	OK	Culvert	2016-09-08	Insignificant barrier	at Canary Hill Rd	Wolfson, Mandy	Hurley Mountain Rd	unknown	Hurley
77122	xy4204965374122806	0.942709616	Reduced AOP		OK	Bridge	43999	Insignificant barrier	Before Cedar Way	Ganon, Ben	Glasco tpk	Unnamed	Woodstock
51729	xy4166601074284850	0.945233708	Full AOP		OK	Culvert	2017-08-15	Insignificant barrier	large crossing between Jansen Rd. and Sheldon Rd.	Clark, Johnathan	Awosting Rd.	tributary to Dwaar Kill	Shawangunk
51224	xy4169333274210130	0.946157608	Reduced AOP		OK	Culvert	2017-08-10	Insignificant barrier	near house No. 1185	Clark, Johnathan	Bruynswick Rd.	tributary to Wallkill River	Gardiner
59178	xy4175383974274875	0.949143319	Full AOP		OK	Bridge	2018-06-04	Insignificant barrier	By House 694	Johnston, Christopher	Granite Road	Stony Kill	Rochester (Ulster)
64277	xy4202762374187993	0.949420412	Full AOP	Purple loosestrife, multiflora, barberry	OK	Bridge	43347	Insignificant barrier	Crossing just before shultis farm rd	Cabanillas, Amanda	CR 45	Unnamed	Woodstock

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48419	xy4160632773986921	0.949584902	Reduced AOP	Channelized downstream	OK	Culvert	2017-07-11	Insignificant barrier	near Partington Ln.	Clark, Johnathan	Plattekill Rd.	tributary to Lattintown Creek	Marlborough
36507	xy4205434774085094	0.953013637	Full AOP		OK	Culvert	2016-06-01	Insignificant barrier	glasco tpk	Wolfson, Mandy	Glasco Tpk	unknown	Woodstock
76992	xy4192158774089880	0.953634502	Reduced AOP	Other 2 is example of downstream armoring failing	OK	Bridge	43994	Insignificant barrier	Near house 1749	Ganon, Ben	Hurley Mountain rd	Unnamed	Hurley
59170	xy4179866274307522	0.954541386	Full AOP		OK	Bridge	2018-06-04	Insignificant barrier	North of large open field	Johnston, Christopher	Samsonville	Mombaccus Creek	Rochester (Ulster)
60069	xy4165571774328718	0.954541386	Full AOP		OK	Bridge	2018-06-19	Insignificant barrier	Right after Church Road	Johnston, Christopher	Indian Springs	Verkeerder Kill	Shawangunk
47108	xy4173392074004649	0.955	Full AOP	BIN 3365220	OK	Bridge	2017-06-22	Insignificant barrier	near New Paltz Rd.	Clark, Johnathan	Pancake Hollow Rd.	Black Creek	Lloyd
59042	xy4181175374166845	0.955	Reduced AOP	Dry	OK	Bridge	2018-06-01	Insignificant barrier	By Benton-Bar Cemetery	Johnston, Christopher	Lucas Turnpike	Kripplebush Creek	Rochester (Ulster)
59065	xy4179598774210665	0.955	Reduced AOP		OK	Bridge	2018-06-01	Insignificant barrier	Just past Thornwood Road	Johnston, Christopher	Lucas Turnpike	North Peters Kill	Rochester (Ulster)
59175	xy4178851374231151	0.955	Full AOP		OK	Bridge	2018-06-04	Insignificant barrier	By Accord Wine and Spirits	Johnston, Christopher	Main Street	Rondout	Rochester (Ulster)
60012	xy4201605674068658	0.955	Full AOP		OK	Bridge	2018-06-20	Insignificant barrier	Half a mile down the road off of Sawkill Road	Johnston, Christopher	Zena Highwoods Road	Saw Kil	Kingston (town)
60028	xy4174323274366445	0.955	Full AOP		OK	Bridge	2018-06-08	Insignificant barrier	Bridge before correctional facility	Johnston, Christopher	Institution Road	Rondout Creek	Wawarsing
60292	xy4203421974104393	0.955	Full AOP		OK	Bridge	2018-06-25	Insignificant barrier	Bridge after House 45	Johnston, Christopher	Chestnut Hill Road	Saw Kill	Woodstock
60301	xy4203195374082943	0.955	Full AOP		OK	Bridge	2018-06-25	Insignificant barrier	Immediately after turn off of Zena Road	Johnston, Christopher	Mellert Road	Saw Kill	Woodstock
77803	xy4192185974214297	0.955	Reduced AOP	Other 2 high erosion us lb_x000D_ Other 3 high erosion ds rb	OK	Bridge	44019	Insignificant barrier	Just past fire department	Ganon, Ben	Atwood rd	Unnamed	Olive
79446	xy4204000673998854	0.955	Full AOP	Other 2 abutment 4. Other 3 span barrel 4	OK	Bridge	44064	Insignificant barrier	Town rd and glasco tpk	Parmelee, Kiah	Town rd	Plattekill Creek	Saugerties
79446	xy4204000673998854	0.955	Full AOP	Other 2 abutment 4. Other 3 span barrel 4	OK	Bridge	44064	Insignificant barrier	Town rd and glasco tpk	Parmelee, Kiah	Town rd	Plattekill Creek	Saugerties
77015	xy4205621974085982	0.955	Reduced AOP		OK	Bridge	43997	Insignificant barrier	Saugerties Woodstock rd and glasco turnpike	Ganon, Ben	W Saugerties rd	Unnamed	Woodstock

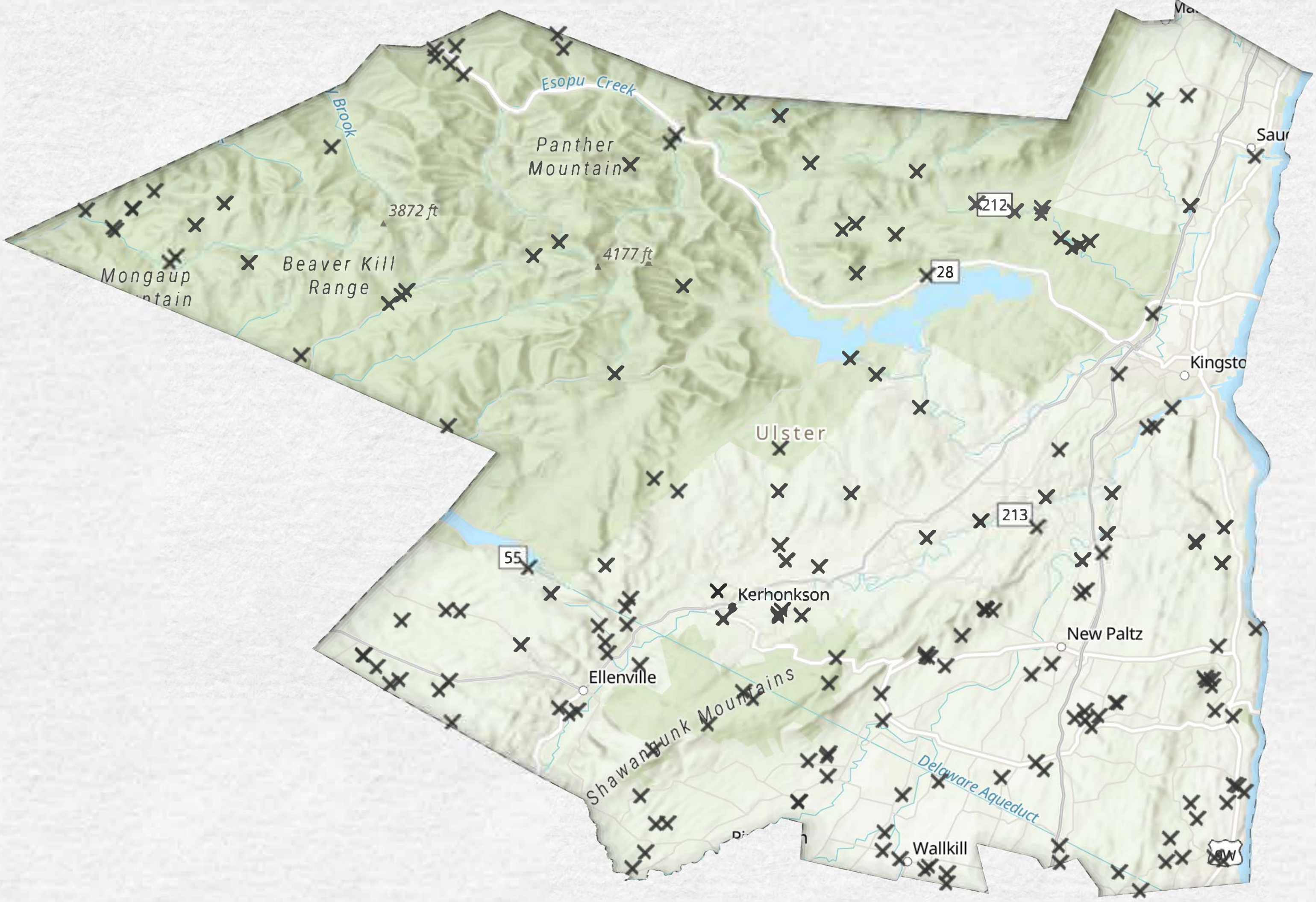
Survey_Id	Crossing_Code	Aqua_Pass_Score	AOP	Crossing_Comment	Crossing_Condition	Crossing_Type	Date_Observed	Evaluation	Location_Description	Observer	Road	Stream_Name	Town
77639	xy4203195374082943	0.955	Full AOP	Other 2 high erosion upstream left bank_x000D_ Other 3 high erosion downstream left bank just past stream	OK	Bridge	44012	Insignificant barrier	Bridge at beginning of road	Ganon, Ben	Mellert rd	Saw Kill	Woodstock
77643	xy4201807474075587	0.955	Full AOP	Other 2 high erosion upstream left bank_x000D_ Other 3 high erosion downstream right bank	OK	Bridge	44012	Insignificant barrier	Before open field with thorn preserve	Ganon, Ben	John joy rd	Saw Kill	Woodstock
48442	xy4185930173974376	0.956810144	Reduced AOP		OK	Culvert	2017-07-13	Insignificant barrier	near intersection with Union Center Rd.	Clark, Johnathan	Ulster Ave.	unnamed	Esopus
41218	xy4192158774089880	0.96406584	Reduced AOP		OK	Bridge	2016-09-08	Insignificant barrier	at Dug Hill Rd	Wolfson, Mandy	Hurley Mountain Road	Englishman	Hurley
64527	xy4202838474212615	0.966996384	Full AOP	Dozens of newt roadkill?s on pavement	OK	Culvert	43354	Insignificant barrier	Adjacent to mailbox 768	Cabanillas, Amanda	CR 40	Unnamed	Woodstock
47858	xy4164055973999558	0.971740862	Full AOP		OK	Culvert	2017-07-06	Insignificant barrier	near B and L 4E Farms	Clark, Johnathan	Lattintown Rd.	Lattintown Creek	Marlborough
51730	xy4167020074292797	0.974306677	Full AOP		OK	Bridge	2017-08-15	Insignificant barrier	at intersection with Sheldon Rd.	Clark, Johnathan	Awosting Rd.	tributary to Dwaar Kill	Shawangunk
78024	xy4212299574021272	0.976097165	Full AOP	Other 2 is of high erosion us rb	OK	Bridge	44025	Insignificant barrier	841 blue mt rd	Ganon, Ben	Blue mountain rd	Plattekill Creek	Saugerties
47495	xy4167593174071727	0.976568986	Full AOP	floods reported upstream	OK	Culvert	2017-06-26	Insignificant barrier	near box No. 1162	Clark, Johnathan	Milton Tpke.	Black Creek	Plattekill
60052	xy4172545174416522	0.9768	Full AOP		OK	Bridge	2018-06-08	Insignificant barrier	Next to house with rock staircase and Kuhlman Drive	Johnston, Christopher	Old Greenfield Road	West Branch Beer Kill	Wawarsing
47852	xy4164411074003132	0.979664127	Full AOP		OK	Culvert	2017-07-06	Insignificant barrier	near intersection with Old Indian Rd.	Clark, Johnathan	Lattintown Rd.	Lattintown Creek	Marlborough
36503	xy4204965374122806	0.979670633	Full AOP		OK	Culvert	2016-05-31	Insignificant barrier	glasco tpk	Wolfson, Mandy	Glasco Tpk	unknown	Woodstock
47080	xy4173739374011063	0.982566292	Full AOP	mink observed in area, swallow nests under bridge	OK	Bridge	2017-06-19	Insignificant barrier	near Town of Lloyd fire station	Clark, Johnathan	New Paltz Rd.	Black Creek	Lloyd
61242	xy4199957174458033	0.986679999	Full AOP		OK	Bridge	2018-07-09	Insignificant barrier	Bridge before couple of houses	Johnston, Christopher	Frost Valley Road	Trib to West Branch Neversink River	Denning
62245	xy4203803874699374	0.98668	Full AOP		OK	Bridge	2018-07-16	Insignificant barrier	Where Alder creek switches to other side of the road	Johnston, Christopher	Alder Creek Road	Alder Creek	Hardenburgh
61452	xy4198696174501348	0.986908849	Full AOP		OK	Bridge	2018-07-09	Insignificant barrier	Bridge at edge of farm near YMCA camp	Johnston, Christopher	Frost Valley Road	Biscuit Brook	Denning
36921	xy4199855674044257	0.989115636	Reduced AOP		New	Bridge	2016-06-22	Insignificant barrier	Sawkill	Wolfson, Mandy	Sawkill	trib to Sawkill	Kingston (town)
62121	xy4197579174521456	0.989327811	Full AOP		OK	Bridge	2018-07-09	Insignificant barrier	Past Hunter Lane by 200 yards	Johnston, Christopher	Frost Valley Road	High Falls Brook	Denning

Survey_Id	Crossing_Code	Aqua_Pass_Score	AOP	Crossing_Comment	Crossing_Condition	Crossing_Type	Date_Observed	Evaluation	Location_Description	Observer	Road	Stream_Name	Town
64525	xy4202909974219643	0.989904828	Full AOP		OK	Bridge	43354	Insignificant barrier	Adjacent to mailbox 842	Cabanillas, Amanda	CR 40	Unnamed	Woodstock
41489	xy4197029273959086	0.991	Full AOP	North of Yale Rd	OK	Bridge	2016-10-25	Insignificant barrier	north of Yale Road	Wolfson, Mandy	Ulster Landing Road	trib to Hudson	Ulster
50795	xy4162435174198042	0.991	Full AOP		OK	Bridge	2017-08-03	Insignificant barrier	near Lippincott Rd.	Clark, Johnathan	Albany Post Rd.	Dwaar Kill	Shawangunk
50797	xy4161527274216157	0.991	Full AOP		OK	Bridge	2017-08-03	Insignificant barrier	fairly large bridge over Dwaar Kill	Clark, Johnathan	Bruyn Tpke.	Dwaar Kill	Shawangunk
51732	xy4166370574305578	0.991	Full AOP		OK	Bridge	2017-08-15	Insignificant barrier	near Terwilliger Ln.	Clark, Johnathan	Awosting Rd.	Beaver Brook	Shawangunk
60045	xy4176963074486447	0.991	Reduced AOP		OK	Bridge	2018-06-08	Insignificant barrier	Bridge after intersection with Sherman Road	Johnston, Christopher	Ulster Heights Road	Botsford Brook	Wawarsing
60882	xy4203529774147172	0.991	Full AOP	Rock wall lining right side looking upstream	OK	Bridge	2018-07-03	Insignificant barrier	Past Woodstock Little League Field	Johnston, Christopher	Yerry Hill Road	Saw Kill	Woodstock
62215	xy4195059874568061	0.991	Full AOP		OK	Bridge	2018-07-10	Insignificant barrier	Before yellow turn sign	Johnston, Christopher	Frost Valley Road	Fall Brook	Denning
62896	xy4196623574294863	0.991	Full AOP		OK	Bridge	2018-07-30	Insignificant barrier	Bridge before Brookside Drive	Johnston, Christopher	Watson Hollow Road	Maltby Hollow Brook	Olive
77014	xy4206146674078554	0.991	Reduced AOP		OK	Bridge	43997	Insignificant barrier	Near house no.95	Ganon, Ben	W saugerties rd	Unnamed	Woodstock
77017	xy4205316374080383	0.991	Reduced AOP		OK	Bridge	43997	Insignificant barrier	Next to house no. 1820	Ganon, Ben	Glasco tpk	Unnamed	Woodstock
77166	xy4203859374118089	0.991	Reduced AOP		OK	Bridge	44000	Insignificant barrier	After pine grove st intersection	Ganon, Ben	Tannery brook rd	Tannery brook	Woodstock
42512	xy4202357474126857	1	Full AOP		No data	No Crossing	2016-06-14	No barrier	doesn't exist	Wolfson, Mandy			Woodstock
48696	xy4189682973968815	1	Full AOP		No data	No Crossing	2017-07-17	No barrier	north of River View Ct.	Clark, Johnathan			Esopus
48886	xy4182464173980267	1	Full AOP		No data	No Crossing	2017-07-18	No barrier	near Frog Hollow Farm	Clark, Johnathan	Old Post Rd.		Esopus
50701	xy4164316374188358	1	Full AOP		No data	No Crossing	2017-08-03	No barrier	north of Long Ln.	Clark, Johnathan	Albany Post Rd.		Gardiner
50775	xy4168753974173993	1	Full AOP		OK	Bridge Adequate	2017-08-01	No barrier	large bridge near Bevier Rd.	Clark, Johnathan	Albany Post Rd.	Wallkill River	Gardiner
50785	xy4184304174085401	1	Full AOP	water reaches bridge abutments, but natural width of stream almost identical to width in the structure	OK	Bridge Adequate	2017-08-01	No barrier	large bridge outside hamlet center	Clark, Johnathan	Keator Ave.	Rondout Creek	Rosendale
50788	xy4174672774090543	1	Full AOP	water reaches bridge abutments, but constriction of natural channel very slight	OK	Bridge Adequate	2017-08-03	No barrier	large bridge outside village center, Carmine Liberta Memorial Bridge	Clark, Johnathan	Rt. 299 New Paltz-Minnewaska Rd.	Wallkill River	New Paltz
50791	xy4163550374188367	1	Full AOP		OK	Bridge Adequate	2017-08-03	No barrier	large bridge near Hoffman Rd.	Clark, Johnathan	Birch Rd.	Wallkill River	Shawangunk

Survey_Id	Crossing_Code	Aqua_Pass_Score	AOP	Crossing_Comment	Crossing_Condition	Crossing_Type	Date_Observed	Evaluation	Location_Description	Observer	Road	Stream_Name	Town
51169	xy4168092674210845	1	Full AOP		OK	Bridge Adequate	2017-08-08	No barrier	near pole No. 194633	Clark, Johnathan	McKinstry Rd.	Wallkill River	Gardiner
51172	xy4167221574217838	1	Full AOP		OK	Bridge	2017-08-08	No barrier	BIN 33480560	Clark, Johnathan	Bruynswick Rd.	tributary to Wallkill River	Gardiner
51218	xy4165619774219760	1	Full AOP		OK	Bridge Adequate	2017-08-08	No barrier	near intersection with Bruynswick Rd.	Clark, Johnathan	Hoagerburgh Rd.	Wallkill River	Shawangunk
51218	xy4165619774219760	1	Full AOP		OK	Bridge Adequate	2017-08-08	No barrier	near intersection with Bruynswick Rd.	Clark, Johnathan	Hoagerburgh Rd.	Wallkill River	Shawangunk
51727	xy4165710374278286	1	Full AOP		No data	No Crossing	2017-08-15	No barrier	near Decker Ln.	Clark, Johnathan			Shawangunk
60008	xy4197972974013814	1	Full AOP		New	Bridge Adequate	2018-06-20	No barrier	Just before intersection with Ulster 31 and 30	Johnston, Christopher	Sawkill Road	Saw Kill	Ulster
62893	xy4196698774286818	1	Full AOP	First cell is dry and vegetated, guardrail and supports are warped on bridge	OK	Bridge Adequate	2018-07-30	No barrier	Large bridge just after High Point Mountain Road	Johnston, Christopher	Watson Hollow Road	Bush Kill	Olive
62893	xy4196698774286818	1	Full AOP	First cell is dry and vegetated, guardrail and supports are warped on bridge	OK	Bridge Adequate	2018-07-30	No barrier	Large bridge just after High Point Mountain Road	Johnston, Christopher	Watson Hollow Road	Bush Kill	Olive
77942	xy4192726174068019	1	Full AOP		OK	Bridge Adequate	44020	No barrier	House 322	Ganon, Ben	Wynkoop rd	Esopus Creek	Hurley
76919	xy4190355674170797	1	Full AOP		No data	No Crossing	43992	No barrier	Mailbox 4311	Ganon, Ben	Atwood rd	Unnamed	Marbletown
77947	xy4187910374144650	1	Full AOP		OK	Bridge Adequate	44020	No barrier	Near intersection of tongore rd	Ganon, Ben	Hurley Mountain rd	Esopus Creek	Marbletown
78052	xy4211286174048914	1	Full AOP		OK	Bridge	44025	No barrier	Bridge at Manorville and w saugerties	Ganon, Ben	W saugerties rd	Plattekill Creek	Saugerties
79255	xy4203804473971769	1	Full AOP		OK	Bridge Adequate	44057	No barrier	Bridge at glasco and 9w	Parmelee, Kiah	Glasco tpk	Esopus Creek	Saugerties
79255	xy4203804473971769	1	Full AOP		OK	Bridge Adequate	44057	No barrier	Bridge at glasco and 9w	Parmelee, Kiah	Glasco tpk	Esopus Creek	Saugerties
79048	xy4199505773997745	1	Full AOP		OK	Bridge Adequate	44050	No barrier	House 198	Ganon, Ben	Leggs mills rd	Esopus Creek	Ulster
79048	xy4199505773997745	1	Full AOP		OK	Bridge Adequate	44050	No barrier	House 198	Ganon, Ben	Leggs mills rd	Esopus Creek	Ulster
79048	xy4199505773997745	1	Full AOP		OK	Bridge Adequate	44050	No barrier	House 198	Ganon, Ben	Leggs mills rd	Esopus Creek	Ulster
79048	xy4199505773997745	1	Full AOP		OK	Bridge Adequate	44050	No barrier	House 198	Ganon, Ben	Leggs mills rd	Esopus Creek	Ulster
78534	xy4197972974013814	1	Full AOP		OK	Bridge Adequate	44039	No barrier	Bridge near heritage energy	Ganon, Ben	Sawkill rd	Saw Kill	Ulster

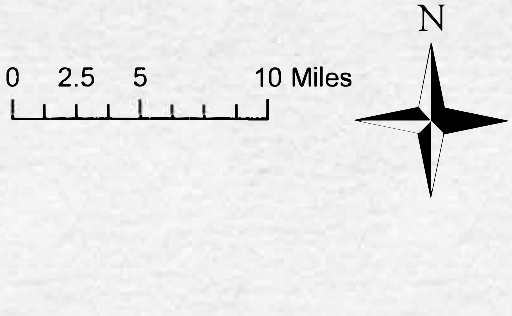
J. Dams in Ulster County, NY

There are 187 dams in Ulster County, NY that are listed in the New York State Inventory of Dams as of 2020. As dams are considered in-stream structures, all dams are potential barriers to aquatic connectivity.



× Dams in Ulster County

Data source: New York State Inventory of Dams
https://gis.ny.gov/gisdata/inventories/details.cfm?DSID=1130



Map by Ulster County Department of the Environment

K. Dams in Ulster County (NYSDEC Inventory of Dams)

STATE_ID	FEDERAL_ID	QUAD	NAME_ONE	NAME_TWO	COUNTY_NAM	REGION_NAM	HAZARD_COD	P1_INSP_DE	SCS	BASIN_NAME	RIVER_STRE	NR_CITY_NA	EAP_STATUS	YEARBUILT	CONSTR_TYP	MUNI	OWNERS	OWNERTYPE	PURPOSES	LAST_INSP	LST_AN_CRT	LST_COND_R	Hudson Aquatic Barrier*	Potential Aquatic Barrier
161-0450	NY14598	C	(161-0450)		Ulster	3	D	None	N	DELAWARE	BEAVER KILL		None	0	OT - Other	Town of Hardenburgh	SALMO FONTINALS CLUB	Private	Other	5/9/1973	Not Found	Not Rated		Y
161-0465	NY14600	D	(161-0465)		Ulster	3	D	None	N	DELAWARE	BEAVER KILL		None	0	OT - Other	Town of Hardenburgh	BALSAM LAKE ANGLER'S CLUB	Private	Other	5/9/1973	Not Found	Not Rated		Y
161-0466	NY14601	C	(161-0466)		Ulster	3	D	None	N	DELAWARE	TR-BEAVER KILL		None	0	OT - Other	Town of Hardenburgh	GARY D SHAVER	Private	Other	5/8/1973	Not Found	Not Rated		Y
161-0467	NY14602	C	(161-0467)		Ulster	3	D	None	N	DELAWARE	BEAVER KILL		None	0	OT - Other	Town of Hardenburgh	Not Found	Not Found	Other	5/8/1973	Not Found	Not Rated		Y
161-0471	NY14603	C	(161-0471)		Ulster	3	D	None	N	DELAWARE	TR-BEAVER KILL		None	0	OT - Other	Town of Hardenburgh	Not Found	Not Found	Other	5/8/1973	Not Found	Not Rated		Y
176-0960	NY14620	D	(176-0960)		Ulster	3	D	None	N	LOWER HUDSON	ESOPUS CREEK		None	0	OT - Other	Town of Shandaken	Not Found	Not Found	Other	5/11/1973	Not Found	Not Rated		Y
176-0983	NY14621	D	(176-0983)		Ulster	3	D	None	N	LOWER HUDSON	TR-CLOVE CREEK		None	0	OT - Other	Town of Shandaken	Not Found	Not Found	Other	5/9/1973	Not Found	Not Rated		Y
176-1000	NY14622	A	(176-1000)		Ulster	3	D	None	N	LOWER HUDSON	BUSHNELLSVILLE CREEK		None	0	OT - Other	Town of Shandaken	Not Found	Not Found	Other	5/7/1973	Not Found	Not Rated		Y
176-1006	NY14623	A	(176-1006)		Ulster	3	D	None	N	LOWER HUDSON	BUSHNELLSVILLE CREEK		None	0	OT - Other	Town of Shandaken	Not Found	Not Found	Other		Not Found	Not Rated		Y
176-1010A	NY14624	A	(176-1010a)		Ulster	3	D	None	N	LOWER HUDSON	TR-BIRCH CREEK		None	0	OT - Other	Town of Shandaken	Not Found	Not Found	Other	5/7/1973	Not Found	Not Rated		Y
177-0750	NY14626	D	(177-0750)		Ulster	3	D	None	N	LOWER HUDSON	TR-VERNOOY CREEK		None	0	OT - Other	Town of Wawarsing	Not Found	Not Found	Other	4/5/1973	Not Found	Not Rated		Y
192-0896	NY14632	D	(192-0896)		Ulster	3	D	None	N	LOWER HUDSON	SAW KILL		None	0	OT - Other	Town of Woodstock	Not Found	Not Found	Other	5/11/1973	Not Found	Not Rated		Y
192-0907	NY14634	D	(192-0907)		Ulster	3	D	None	N	LOWER HUDSON	SAW KILL		None	0	OT - Other	Town of Woodstock	Not Found	Not Found	Other	4/25/1973	Not Found	Not Rated		Y
193-0166A	NY14707	B	(193-0166a)		Ulster	3	D	None	N	LOWER HUDSON	RONDOUT CREEK		None	0	OT - Other	Town of Esopus, City of Kingston	Not Found	Not Found	Other	5/30/1990	Not Found	Not Rated		Y
193-0826	NY14636	A	(193-0826)		Ulster	3	D	None	N	LOWER HUDSON	TR-ESOPUS CREEK		None	0	OT - Other	Town of Marbletown	Not Found	Not Found	Other	4/24/1973	Not Found	Not Rated		Y
194-0606	NY14638	C	(194-0606)		Ulster	3	D	None	N	LOWER HUDSON	TR-WALLKILL RIVER		None	0	OT - Other	Town of Shawangunk	Not Found	Not Found	Other	4/19/1973	Not Found	Not Rated		Y
161-3059	NY01222	C	Alder Lake Dam		Ulster	3	A	None	N	DELAWARE	ALDER CREEK	Turnwood	None	1994	RE - Earth, CN - Concrete Gravity	Town of Hardenburgh	NYS DEC - DIVISION OF FISH AND WILDLIFE	State	Recreation	8/28/2012	Not Found	Not Rated		Y
192-4888	NY13135	D	Alex Rice Mckim Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-SAW KILL CREEK	Sweet Meadows	None	0	RE - Earth	Town of Woodstock	WALRUS PROPERTIES LLC	Private	Recreation	7/18/1986	Not Found	Not Rated		Y
193-0855	NY00041	A	Ashokan Dam	Olive Bridge Dam	Ulster	3	C	OK	N	LOWER HUDSON	ESOPUS CREEK	Olive Bridge	On File	1916	RE - Earth, MS - Masonry	Town of Olive	NYCDEP DAMS WEST OF THE HUDSON RIVER	Local Government	Water Supply - Primary	11/9/2018	12/16/2019	Deficiently maintained		Y
194-5853	NY16998	A	Bales Dam		Ulster	3	A		N	LOWER HUDSON	Unnamed Trib - Wara Kill		None	0	ST - Laid Up Stone	Town of Gardiner	JAMES E BALES	Private	Recreation	4/10/2014	Not Found	Not Rated		Y
161-0470	NY01232	C	Beecher Lake Dam		Ulster	3	A	None	N	DELAWARE	BEECHER BROOK	Turnwood	None	1925	RE - Earth	Town of Hardenburgh	New York Zendo Shobo-Ji	Private	Recreation	8/28/2014	1/25/2010	Not Rated		Y
176-5806	NY16942	A	Belleayre Snowmaking Pond Dam		Ulster	3	D		N	LOWER HUDSON	Trib - Birch Creek	Pine Hill	None	0	RE - Earth	Town of Shandaken	NYS DEC	State	Recreation		Not Found	Not Rated		Y
177-2249	NY12920	D	Ben Benson Lake Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-RONDOUT CREEK	Kerhonkson	None	1955	RE - Earth	Town of Rochester	BEN BENSON	Private	Recreation	4/4/1973	Not Found	Not Rated		Y
193-0863	NY01130	B	Binnewater Reservoir Dam & Dike		Ulster	3	B	None	N	LOWER HUDSON	TR-ESOPUS CREEK	Kingston	On File	1926	RE - Earth	Town of Ulster	CITY OF KINGSTON	Local Government	Recreation	6/26/2019	1/31/2011	Unsound - More Analysis needed		Y
193-4813	NY13152	D	Binnewater Road Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-RONDOUT CREEK	Rosendale	None	0	MS - Masonry	Town of Rosendale	TOWN OF ROSENDALE	Local Government	Other	10/27/2015	5/1/2014	No deficiencies noted		Y
194-0607	NY13161	C	Borden Home Pond Dam #1		Ulster	3	A	None	N	LOWER HUDSON	TR-WALLKILL RIVER	Walden	None	1891	CN - Concrete Gravity, RE - Earth	Town of Shawangunk	BORDEN HOME FARM	Private	Fire Protection, Stock, Or Small Farm Pond, Recreation	4/19/1973	Not Found	Not Rated		Y
194-0615	NY13163	C	Borden Home Pond Dam #3		Ulster	3	A	None	N	LOWER HUDSON	TR-WALLKILL RIVER	Walden	None	1850	RE - Earth, ER - Rockfill	Town of Shawangunk	TOWN OF SHAWANGUNK	Local Government	Other	8/27/2009	Not Found	Not Rated		Y
194-5453	NY16068	C	Borden Home Pond Dam #4		Ulster	3	A	None	N	LOWER HUDSON		Wallkill	None	1850	RE - Earth	Town of Shawangunk	TOWN OF SHAWANGUNK	Local Government	Recreation	8/27/2009	Not Found	Not Rated		Y
212-5004	NY14151	A	Bridgeview Plaza Dam		Ulster	3	B	None	N	LOWER HUDSON	NONE	Highland	None	0	RE - Earth	Town of Lloyd	BRIDGEVIEW SP CORP	Private	Flood Control and Storm Water Management	1/11/2017	2/4/2019	Not Rated		Y
211-1024	NY13440	C	Broglio Pond Dam		Ulster	3	A	None	N	LOWER HUDSON	BLACK CREEK	Esopus	None	1934	CN - Concrete Gravity	Town of Esopus	John Burroughs Assocoation	Private	Recreation	10/6/2016	Not Found	Not Rated		Y
177-3570	NY12925	D	Camp Grant Lake Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-RONDOUT CREEK	Granite	None	0	RE - Earth	Town of Rochester	CAMP GRANITE	Private	Recreation	4/4/1973	Not Found	Not Rated		Y
177-4066	NY12927	C	Camp Napanoch Pond Dam		Ulster	3	A	None	N	LOWER HUDSON	RONDOUT CREEK	Lackawack	None	1973	ER - Rockfill	Town of Wawarsing	CAMP NAPANOCH	Private	Recreation	12/31/1901	Not Found	Not Rated		Y
176-1236	NY12911	D	Camp Pond Dam	Muddy Brook Pond Dam	Ulster	3	A	None	N	LOWER HUDSON	MUDDY BROOK	Phoenicia	None	1946	CN - Concrete Gravity, RE - Earth	Town of Shandaken	J EDWARDS	Private	Recreation	4/17/2013	Not Found	Not Rated		Y
177-3253	NY12922	C	Camp Westmont Pond Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-BEER KILL	Ulster Heights	None	1964	CN - Concrete Gravity	Town of Wawarsing	BENJAMIN TZENG	Private	Recreation	4/26/2011	Not Found	Not Rated		Y
178-0751	NY00265	A	Cape Pond Dam		Ulster	3	B	Unsafe Spillway Capacity	N	LOWER HUDSON	BEER KILL	Ellenville	On File	1914	RE - Earth	Town of Wawarsing	CAPE POND INC.	Private	Recreation	1/11/2017	1/28/2019	No deficiencies noted		Y
193-0770	NY00782	C	Central Hudson Dam At High Falls	High Falls Dam	Ulster	3	A	None	N	LOWER HUDSON	RONDOUT CREEK	High Falls	None	1935	CN - Concrete Gravity	Town of Marbletown	Central Hudson Gas & Electric Corp.	Public Utility	Hydroelectric	3/16/2009	2/3/2011	Not Rated		Y
193-2416	NY13143	C	Chaits Hotel Lake Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-ROCHESTER CREEK	Accord	None	1956	RE - Earth	Town of Rochester	CHAITS HOTEL	Private	Recreation	4/4/1973	Not Found	Not Rated		Y
212-0683	NY13487	A	Chance Pond Dam		Ulster	3	A	None	N	LOWER HUDSON	TWAALFSKILL CREEK	Highland	None	1911	MS - Masonry, RE - Earth	Town of Lloyd	PHILIP SCHANTZ	Private	Recreation	4/27/1973	Not Found	Not Rated		Y
176-5507	NY16127	D	Chichester Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-STONY CLOVE	Chichester	None	0	RE - Earth, RE - Earth	Town of Shandaken	PAUL & HEIDI NUTE	Private	Recreation	8/30/2016	7/23/2013	Not Rated		Y
193-4239	NY13148	D	Chousa Pond Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-WALLKILL RIVER	Rifton	None	1976	RE - Earth, CN - Concrete Gravity	Town of New Paltz	MANUEL R CHOUSA	Private	Recreation	12/12/2012	Not Found	Not Rated		Y

* Source: WRI/HREP "Biologically Important Barriers" https://www.google.com/maps/d/u/0/viewer?mid=1yjfPSCYwn7tGtGNU2x5eSZRVWAE&ll=41.86329407400885%2C-73.94817599999999&z=8

Data Source: *NYSDEC Inventory of Dams* https://gis.ny.gov/gisdata/inventories/details.cfm?DSID=1130

STATE_ID	FEDERAL_ID	QUAD	NAME_ONE	NAME_TWO	COUNTY_NAM	REGION_NAM	HAZARD_COD	P1_INSP_DE	SCS	BASIN_NAME	RIVER_STRE	NR_CITY_NA	EAP_STATUS	YEARBUILT	CONSTR_TYP	MUNI	OWNERS	OWNERTYPE	PURPOSES	LAST_INSP	LST_AN_CRT	LST_COND_R	Hudson Aquatic Barrier*	Potential Aquatic Barrier
194-0657	NY13165	B	Coles Pond Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-BUSHFIELD CREEK	Modena	None	1925	RE - Earth, ER - Rockfill	Town of Plattekill	FOX GLEN ON THE LAKE	Private	Other, Recreation	1/11/2011	Not Found	Not Rated		Y
192-0757	NY00081	C	Cooper Lake Dam And West Dike		Ulster	3	C	Unsafe Stability	N	LOWER HUDSON	SAW KILL	Shady	On File	1800	RE - Earth	Town of Woodstock	CITY OF KINGSTON	Local Government	Water Supply - Primary	7/29/2019	1/31/2011	Unsound - Fair		Y
194-3109	NY13178	A	Corey Pond Dam		Ulster	3	A	None	Y	LOWER HUDSON	TR-SHAWANGUNK KILL	Bruynswick	None	1962	RE - Earth	Town of Shawangunk	EUGENE O COREY	Private	Fire Protection, Stock, Or Small Farm Pond	4/23/1973	Not Found	Not Rated		Y
178-1302	NY12952	D	Covino Pond Dam		Ulster	3	A	None	N	LOWER HUDSON	TOMY KILL	Pine Bush	On File	1948	RE - Earth, CN - Concrete Gravity	Town of Shawangunk	MANUSCO & FAMILY LLC	Private	Recreation	10/25/2011	1/26/2011	Not Rated		Y
193-5048	NY14325	D	Culinarian Home Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-WALLKILL RIVER		None	1990	RE - Earth, CN - Concrete Gravity	Town of New Paltz	CULINARIAN HOME FOUNDATION	Private	Other	12/6/2012	Not Found	Not Rated		Y
193-0759	NY00076	D	Dashville Dam		Ulster	3	A	Unsafe Stability	N	LOWER HUDSON	WALLKILL RIVER	Dashville	None	1922	CN - Concrete Gravity	Town of New Paltz	Central Hudson Gas & Electric Corp.	Public Utility	Hydroelectric	9/4/2008	Not Found	Not Rated		Y
177-3540	NY12924	D	Davis Pond Dam		Ulster	3	A	None	N	LOWER HUDSON	BEAVER DAM BROOK	Accord	None	1967	RE - Earth	Town of Olive	WILLIAM A DAVIS	Private	Recreation	4/4/1973	Not Found	Not Rated		Y
176-0964	NY12909	D	Day Pond Dam		Ulster	3	A	None	N	LOWER HUDSON	PANTHER KILL	Phoenicia	None	1930	CN - Concrete Gravity	Town of Shandaken	Tibet House USA	Private	Recreation	4/9/2009	1/8/2010	Not Rated		Y
178-5025	NY14175	B	Deborah Martin Dam		Ulster	3	A	None	N	LOWER HUDSON		Ulsterville	None	0	RE - Earth	Town of Shawangunk	DEBORAH MARTIN	Private	Other	3/14/1988	Not Found	Not Rated		Y
194-3053	NY13177	D	Diachishin Lake Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-GIDNEYTOWN CREEK	Fostertown	None	1962	RE - Earth, CN - Concrete Gravity	Town of Plattekill	Diane Diachishin	Private	Recreation	9/19/2013	Not Found	Not Rated		Y
193-0813	NY13140	B	Diamond Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-RONDOUT RIVER	New Salem	None	1897	MS - Masonry, ER - Rockfill	Town of Esopus	GILSON C. DASILVA	Private	Other, Recreation	9/16/2009	Not Found	Not Rated		Y
210-0829	NY00089	C	Diamond Mills Paper Company Dam		Ulster	3	C	Unsafe Emergency	N	LOWER HUDSON	ESOPUS CREEK	Saugerties	On File	1929	CN - Concrete Gravity	Village of Saugerties, Town of Saugerties	LEADING EDGE DEVELOPERS, LLC	Private	Irrigation, Recreation	11/5/2018	8/5/2016	No deficiencies noted	Y	Y
193-5962	NY17134	C	DUCK POND DAM		Ulster	3	A		N	LOWER HUDSON	Klein Kill		None	0	-	Town of New Paltz	MOHONK PRESERVE INC	Private	Not Found	11/13/2018	Not Found	Not Rated		Y
178-5786	NY16927	B	Eastern Dam		Ulster	3	A		N	LOWER HUDSON	Trib - Roundout Creek	East Wawarsing	None	0	CN - Concrete Gravity	Town of Wawarsing	NYS Department of Corrections and Community Supervision - Faciltiies Planning	State	Fire Protection, Stock, Or Small Farm Pond		Not Found	Not Rated		Y
193-0812	NY01136	B	Eddyville Dam		Ulster	3	A	None	N	LOWER HUDSON	RONDOUT CREEK	New Salem	None	1850	MS - Masonry	Town of Esopus	ETHAN RAPP	Private	Other	9/16/2009	Not Found	Not Rated	Y	Y
177-3455	NY01133	D	Eugene Melnyczuk Lake Dam		Ulster	3	D	None	N	LOWER HUDSON	SAPBUSH CREEK	Cherrytown	None	1965	RE - Earth	Town of Rochester	VILLAGE OF COXSACKIE	Local Government	Recreation	10/9/1984	Not Found	Not Rated		Y
178-0978	NY00640	D	Fly Brook Dam		Ulster	3	A	None	N	LOWER HUDSON	FLY BROOK	None	None	1933	RE - Earth	Town of Wawarsing	GEORGE SMILEY & SON	Private	Recreation	5/20/2010	Not Found	Not Rated		Y
178-0767	NY00274	B	Fly Brook Dam	Mud Pond	Ulster	3	0	None	N	LOWER HUDSON	FLY BROOK	None	None	1927	RE - Earth	Town of Wawarsing	GEORGE SMILEY	N/A	Recreation	12/31/1901	Not Found	Not Rated		Y
161-0452	NY01411	C	Forest Lake Dam		Ulster	3	A	None	N	DELAWARE	TR-BEAVER KILL	Turnwood	None	1905	RE - Earth	Town of Hardenburgh	DUNGKAR GOMPA SOCIETY INC	Private	Recreation	4/17/2008	Not Found	Not Rated		Y
162-0432	NY12746	B	Forstmann Pond Dam #1		Ulster	3	A	None	N	DELAWARE	W BRANCH NEVERSINK RIVER	Claryville	None	1918	RE - Earth	Town of Denning	JULIUS FORSTMAN	Private	Recreation	5/8/1973	Not Found	Not Rated		Y
162-0436	NY12747	B	Forstmann Pond Dam #2		Ulster	3	A	None	N	DELAWARE	PARKER BROOK	Claryville	None	1918	RE - Earth	Town of Denning	JULIUS FORSTMANN	Private	Recreation	5/8/1973	Not Found	Not Rated		Y
193-4702	NY13150	B	Fourth Lake Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-RONDOUT CREEK	Binnewater	None	0	RE - Earth	Town of Rosendale	JAMES VALEO	Private	Recreation	5/16/1997	Not Found	Not Rated		Y
211-5300	NY14977	C	Freer Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-SWARTEKILL		None	1997	RE - Earth	Town of Esopus	JOHN FREER	Private	Recreation	10/2/1996	Not Found	Not Rated		Y
178-0731	NY12947	A	Frost Pond Dam		Ulster	3	A	None	N	LOWER HUDSON	RONDOUT CREEK	Napanoch	None	1910	CN - Concrete Gravity, MS - Masonry	Town of Wawarsing	NEWTON & FRED FROST	Private	Recreation	4/4/1973	Not Found	Not Rated		Y
212-0621	NY13480	C	Gatey Dam		Ulster	3	A	None	N	LOWER HUDSON	OLD MANS KILL	Marlboro	None	1913	MS - Masonry, ER - Rockfill	Town of Marlborough	HENRY GATEY	Private	Irrigation	6/23/1973	Not Found	Not Rated		Y
194-3807	NY13186	A	Gillon Pond Dam		Ulster	3	A	None	Y	LOWER HUDSON	TR-MARA KILL	Heddon Corners	None	1969	RE - Earth	Town of Gardiner	ADAM GILLON	Private	Recreation	2/4/2013	Not Found	Not Rated		Y
163-0746	NY12772	B	Goldstein Pond Dam		Sullivan	3	A	None	N	LOWER HUDSON	TR-BRADEN BROOK	Mountain Dale	None	1908	MS - Masonry, ER - Rockfill	Town of Wawarsing	Stone Wall Holding Corporation	Private	Recreation	4/6/1973	Not Found	Not Rated		Y
177-3347	NY12923	D	Grant Hotel Lake Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-RONDOUT CREEK	Grainte	None	1965	CN - Concrete Gravity	Town of Rochester	MAX GELLER	Private	Recreation	11/22/2011	Not Found	Not Rated		Y
194-3591	NY13183	A	Gregg Farm Pond Dam		Ulster	3	A	None	Y	LOWER HUDSON	TR-WALLKILL RIVER	Wallkill	None	1966	RE - Earth	Town of Gardiner	ROONEY GREGG	Private	Fire Protection, Stock, Or Small Farm Pond	11/24/2009	Not Found	Not Rated		Y
194-2455	NY13175	D	Greiner Bros Pond Dam		Ulster	3	A	None	Y	LOWER HUDSON	TR-HUDSON RIVER	Marlboro	None	1955	RE - Earth	Town of Marlborough	GREINER BROTHERS	Private	Fire Protection, Stock, Or Small Farm Pond	4/26/1973	Not Found	Not Rated		Y
192-4108	NY13129	C	Grog Kill Development Dam		Ulster	3	A	None	N	LOWER HUDSON	BEAVER KILL	Mt. Tremper	None	0	MS - Masonry, ER - Rockfill	Town of Woodstock	NED ROMANO	Private	Recreation	7/11/1973	Not Found	Not Rated		Y
194-0600	NY13160	D	Groom Mill Pond Dam		Ulster	3	A	None	N	LOWER HUDSON	QUASSAIC CREEK	Cronomer Valley	None	1925	MS - Masonry	Town of Plattekill	Edward A. Wolfe, Jr.	Private	Hydroelectric, Irrigation	12/18/2012	Not Found	Not Rated		Y
212-2484	NY13506	A	Gruner Wildlife Marsh Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-TWAALFSKILL CREEK	Highland	None	1956	RE - Earth	Town of Lloyd	LOUIS J GRUNER	Private	Other	4/26/1973	Not Found	Not Rated		Y
212-5528	NY16153	A	Hallock Pond Dam		Ulster	3	A	None	N	Unknown			None	1800	RE - Earth, ST - Laid Up Stone	Town of Marlborough	GLENN S CLARKE	Private	Recreation		Not Found	Not Rated		Y
178-3789	NY12962	A	Harris Pond Dam		Ulster	3	0	None	N	LOWER HUDSON	TR-SANDBURG CREEK	Ellenville	None	1969	RE - Earth	Town of Wawarsing	HAROLD HARRIS	N/A	Recreation	4/6/1973	Not Found	Not Rated		Y
161-0474	NY12735	C	Hatchery Pond #2 Dam		Ulster	3	A	None	N	DELAWARE	ALDER CREEK	Turnwood	None	1880	RE - Earth	Town of Hardenburgh	WARD CARROLL	Private	Other	5/8/1973	Not Found	Not Rated		Y

STATE_ID	FEDERAL_ID	QUAD	NAME_ONE	NAME_TWO	COUNTY_NAM	REGION_NAM	HAZARD_COD	P1_INSP_DE	SCS	BASIN_NAME	RIVER_STRE	NR_CITY_NA	EAP_STATUS	YEARBUILT	CONSTR_TYP	MUNI	OWNERS	OWNERTYPE	PURPOSES	LAST_INSP	LST_AN_CRT	LST_COND_R	Hudson Aquatic Barrier*	Potential Aquatic Barrier
161-0473	NY12734	C	Hatchery Pond Dam		Ulster	3	A	None	N	DELAWARE	ALDER CREEK	Turnwood	None	1913	RE - Earth	Town of Hardenburgh	WARD CARROLL	Private	Other	5/8/1973	Not Found	Not Rated		Y
194-4228	NY00873	A	Heddens Lake Dam	Heddens Lake	Ulster	3	D	None	N	LOWER HUDSON	MARA KILL	Ganahgote	None	1900	CN - Concrete Gravity	Town of Gardiner	JOSEPH L KATZ	Private	Recreation	1/11/2011	Not Found	Not Rated		Y
212-0682	NY00882	A	Highland Lower Reservoir Dam		Ulster	3	B	None	N	LOWER HUDSON	TR-TWAALFS KILL	Highland	On File	1916	CN - Concrete Gravity, MS - Masonry	Town of Lloyd	TOWN OF LLOYD HIGHLAND WATER DISTRICT	Local Government	Water Supply - Primary	1/11/2017	1/28/2019	Not Rated		Y
212-0682B	NY13486	A	Highland Reservoir #1 Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-HUDSON RIVER	Highland	None	1985	RE - Earth	Town of Lloyd	TOWN OF LLOYD HIGHLAND WATER DISTRICT	Local Government	Water Supply - Primary	7/11/2013	Not Found	Not Rated		Y
212-0682A	NY13485	A	Highland Reservoir #2 Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-HUDSON RIVER	Highland	None	0	MS - Masonry, ER - Rockfill	Town of Lloyd	TOWN OF LLOYD HIGHLAND WATER DISTRICT	Local Government	Water Supply - Primary	7/11/2013	Not Found	Not Rated		Y
212-1169	NY01108	A	Highland Water Dist Res Dam & Dike		Ulster	3	B	None	N	LOWER HUDSON	TR-to Twaalfskill	Highland	On File	1939	RE - Earth	Town of Lloyd	TOWN OF LLOYD HIGHLAND WATER DISTRICT	Local Government	Recreation, Water Supply - Secondary	1/11/2017	1/28/2019	Not Rated		Y
177-0735	NY00073	C	Honk Falls Dam		Ulster	3	C	Unsafe Spillway Capacity	N	LOWER HUDSON	RONDOUT CREEK	Napanoch	On File	1898	CN - Concrete Gravity	Town of Wawarsing	NYCDEP DAMS WEST OF THE HUDSON RIVER	Local Government	Recreation	7/25/2019	Not Found	Unsound - More Analysis needed		Y
193-4107	NY13145	D	Horsenden Lake Dam	Camino Lake Dam, James Rappa Dam	Ulster	3	A	None	N	LOWER HUDSON	TR-WALLKILL RIVER	Rifton	On File	1981	RE - Earth	Town of New Paltz	JAMES E RAPPA	Private	Recreation	4/4/2013	12/31/2013	Not Rated		Y
194-3384	NY13180	B	Hurd Farm Pond Dam		Ulster	3	A	None	Y	LOWER HUDSON	TR-BLACK CREEK	Clintondale	None	1965	RE - Earth	Town of Lloyd	M G HURD & SONS	Private	Fire Protection, Stock, Or Small Farm Pond	12/12/2012	Not Found	Not Rated		Y
194-5820	NY16982	B	Hurds Road Dam		Ulster	3	A		N	LOWER HUDSON	Trib - Basher Creek	Elder	None	0	RE - Earth	Town of Lloyd	Hurd Orchard	Private	Fire Protection, Stock, Or Small Farm Pond	12/18/2012	Not Found	Not Rated		Y
178-4768	NY01208	B	I Scott Watkins Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-VERKEERDER KILL	Ulsterville	None	1983	RE - Earth	Town of Shawangunk	K. Veronica WATKINS	Private	Recreation	7/18/2012	Not Found	Not Rated		Y
194-5716	NY16249	B	JANSEN ROAD DAM		Ulster	3	D		N				None	0	RE - Earth, ST - Laid Up Stone	Town of New Paltz	MCDONALD ROAD CORPORATION	Private	Flood Control and Storm Water Management	1/11/2011	Not Found	Not Rated		Y
194-5800	NY16939	C	JB Crowel & Son Dam		Ulster	3	A		N	LOWER HUDSON	Shawangunk	Wallkill	None	1870	CN - Concrete Gravity, RE - Earth	Town of Shawangunk	Wendy C. Sutherland	Private	Hydroelectric		Not Found	Not Rated		Y
163-3427	NY17060	B	Jellystone Park Dam		Ulster	3	A		N	LOWER HUDSON	Tr-West Branch Beer		None	0	RE - Earth	Town of Wawarsing	Sun Jelly-Birchwood NY RV LLC	Private	Recreation	3/9/2017	Not Found	Not Rated		Y
163-5893	NY17059	B	Jellystone Park Dam		Ulster	3	A		N				None	0	RE - Earth	Town of Wawarsing	Atwell LLC	Private	Recreation		Not Found	Not Rated		Y
194-2161	NY13172	A	Jenkins & Lueken Pond Dam		Ulster	3	A	None	Y	LOWER HUDSON	TR-MARA KILL	Heddon Corners	None	1954	RE - Earth	Town of New Paltz	JENKINS & LUEKEN	Private	Other	12/12/2012	Not Found	Not Rated		Y
212-2504	NY13507	A	John Fogua Pond Dam		Ulster	3	A	None	Y	LOWER HUDSON	TR-HUDSON RIVER	None	None	1956	RE - Earth	Town of Marlborough	JOHN FOGUA	Private	Fire Protection, Stock, Or Small Farm Pond	5/11/1973	Not Found	Not Rated		Y
212-2616	NY13508	C	Joseph Rapasardi Pond Dam		Ulster	3	A	None	Y	LOWER HUDSON	TR-HUDSON RIVER	Marlboro	None	1957	RE - Earth	Town of Marlborough	JOSEPH RAPASARDI	Private	Fire Protection, Stock, Or Small Farm Pond	4/26/1973	Not Found	Not Rated		Y
178-4302	NY12966	A	Kadansky Pond Dam		Sullivan	3	D	None	N	LOWER HUDSON	W BRANCH BEER KILL	Greenfield Park	None	1978	RE - Earth, ER - Rockfill	Town of Wawarsing	JACK KADANSKY	Private	Recreation	6/25/1985	Not Found	Not Rated		Y
211-2651	NY13454	C	Kay Reifler Pond Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-HUDSON RIVER	Poughkeepsie	None	1958	MS - Masonry, ER - Rockfill	Town of Lloyd	KAY REIFLER INC	Private	Recreation	4/26/1973	Not Found	Not Rated		Y
178-4301	NY00921	A	Keejo Lake Dam	Keejo Lake	Ulster	3	A	None	N	LOWER HUDSON	TR-SANDBURG CREEK	Spring Glen	None	1980	RE - Earth	Town of Wawarsing	MARK & STEPHANY TURETSKY	Private	Recreation	9/4/2008	Not Found	Not Rated		Y
193-4512	NY01273	A	Kenozia Lake Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-ASHOKAN RESERVOIR	None	None	1958	CN - Concrete Gravity	Town of Hurley	TOWN OF HURLEY, Tonche Associates, Inc.	Local Government, Private	Recreation	6/30/2011	Not Found	Not Rated		Y
177-1202	NY12918	D	Kerhonksen Water District Dam #2		Ulster	3	A	None	N	LOWER HUDSON	TR-RONDOUT CREEK	Kerhonksen	None	1942	CN - Concrete Gravity	Town of Wawarsing	KERHONKSEN WATER DISTRICT	Local Government	Water Supply - Primary	5/15/1997	Not Found	Not Rated		Y
192-0890	NY13126	D	Kingston Reservoir #1 Dam		Ulster	3	A	None	N	LOWER HUDSON	SAWKILL	Sweet Meadows	None	1891	CN - Concrete Gravity	Town of Woodstock	CITY OF KINGSTON	Local Government	Water Supply - Secondary	11/18/2009	Not Found	Not Rated		Y
192-0908	NY00080	D	Kingston Reservoir #2 Dam		Ulster	3	B	None	N	LOWER HUDSON	SAW KILL	Zena	On File	1910	CN - Concrete Gravity, RE - Earth	Town of Woodstock	CITY OF KINGSTON	Local Government	Recreation	6/26/2019	1/31/2011	Unsound - More Analysis needed		Y
192-0890A	NY01326	D	Kingston Reservoir #4 Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-SAW KILL	Sweet Meadows	None	1909	RE - Earth	Town of Woodstock	CITY OF KINGSTON	Local Government	Water Supply - Secondary	11/18/2009	Not Found	Not Rated		Y
178-4698	NY12967	B	Lake Awosting Dam		Ulster	3	0	None	N	LOWER HUDSON	PETERS KILL	Minnewaska	None	0	RE - Earth	Town of Wawarsing	NYSOPRHP - PALISADES INTERSTATE PARK COMMISSION	State	Recreation	9/6/1980	Not Found	Not Rated		Y
194-3976	NY13187	B	Lake Endla Dam		Ulster	3	A	None	N	LOWER HUDSON	PLATTEKILL CREEK	Modena Gardens	None	1973	RE - Earth	Town of Plattekill	RUDOLF SUSI	Private	Recreation	12/18/2012	Not Found	Not Rated		Y
178-0680	NY01433	B	Lake Maratanza Dam		Ulster	3	B	None	N	LOWER HUDSON	TR-VERKEERDER KILL	Crawford	None	1923	RE - Earth	Village of Ellenville	VILLAGE OF ELLENVILLE, NYSOPRHP - PALISADES INTERSTATE PARK COMMISSION	Local Government, State	Water Supply - Secondary	7/25/2019	10/15/2010	Unsound - Fair		Y
194-5232	NY14862	A	Lake Minnewaska Dam	Carriage Road Dam	Ulster	3	A	None	N	LOWER HUDSON	COXING KILL		None	1930	RE - Earth	Town of Gardiner	Palisades Interstate Park Comm	State	Recreation, Water Supply - Primary	2/25/2013	Not Found	Not Rated		Y
176-1384	NY12912	A	Lilliput Camp Pond Dam		Ulster	3	A	None	N	LOWER HUDSON	BIRCH CREEK	Pine Hill	None	1949	CN - Concrete Gravity	Town of Shandaken	MURRAY SINGER	Private	Recreation	5/7/1973	Not Found	Not Rated		Y

STATE_ID	FEDERAL_ID	QUAD	NAME_ONE	NAME_TWO	COUNTY_NAM	REGION_NAM	HAZARD_COD	P1_INSP_DE	SCS	BASIN_NAME	RIVER_STRE	NR_CITY_NA	EAP_STATUS	YEARBUILT	CONSTR_TYP	MUNI	OWNERS	OWNERTYPE	PURPOSES	LAST_INSP	LST_AN_CRT	LST_COND_R	Hudson Aquatic Barrier*	Potential Aquatic Barrier
177-5885	NY17049	D	Lundy Pond Dam		Ulster	3	A		N	LOWER HUDSON	Trib - Vernoy Kill		None	0	RE - Earth	Town of Wawarsing	NYS DEC DIVISION OF LANDS & FORESTS	State	Recreation	2/26/2016	Not Found	Not Rated		Y
177-5894	NY17061	B	Lundy Road Dam		Ulster	3	A		N	LOWER HUDSON	Vernooy Kill		None	0	CN - Concrete Gravity	Town of Wawarsing	Not Found	Not Found	Recreation	6/24/2016	Not Found	Not Rated		Y
177-0752	NY00844	D	Lyon Lodge Dam		Ulster	3	B	None	N	LOWER HUDSON	LYON CREEK	Wawarsing	None	1925	RE - Earth	Town of Wawarsing	Lyons Lodge LLC	Private	Recreation	7/25/2019	Not Found	Unsound - More Analysis needed		Y
193-4710	NY13151	C	Lyonsville Pond Dam		Ulster	3	A	None	N	LOWER HUDSON	NORTH PETERS KILL	Whitfield	None	1920	RE - Earth	Town of Marbletown	SAGE	Private	Recreation	6/19/1980	Not Found	Not Rated		Y
194-3224	NY01110	D	Marlborough Water District Dam & Dike		Ulster	3	B	None	N	LOWER HUDSON	TR-HUDSON RIVER	Marlboro	None	1964	RE - Earth	Town of Marlborough	MARLBOROUGH WATER DISTRICT	Local Government	Water Supply - Secondary	3/9/2017	Not Found	Not Rated		Y
192-0959	NY14338	C	Mcevoy Pond Dam		Ulster	3	0	None	N	LOWER HUDSON	TR-SAW KILL	Woodstock	None	1933	MS - Masonry	Town of Woodstock	GOOD POND CO.	Private	Fire Protection, Stock, Or Small Farm Pond, Other, Recreation	4/24/1973	Not Found	Not Rated		Y
177-1789	NY12919	D	Megel & Geller Lake Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-RONDOUT CREEK	Kerhonkson	None	1953	RE - Earth	Town of Rochester	MEGEL & GELLER	Private	Recreation	4/4/1973	Not Found	Not Rated		Y
161-3824	NY00526	C	Merrill & Rutherford Dam		Ulster	3	A	None	Y	DELAWARE	TR-BEECHER BROOK	Hardenburg	None	1969	RE - Earth	Town of Hardenburgh	ZEN STUDIES SOCIETY INC	Private	Recreation	5/10/1973	Not Found	Not Rated		Y
177-1156	NY00074	C	Merriman Dam	Rondout Reservoir	Ulster	3	C	OK	N	LOWER HUDSON	RONDOUT CREEK	Lackawack	On File	1945	RE - Earth	Town of Wawarsing	NYCDEP DAMS WEST OF THE HUDSON RIVER	Local Government	Water Supply - Primary	11/2/2018	12/16/2019	No deficiencies noted		Y
194-5158	NY14808	B	Mike Lembo Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-PLATTEKILL	Modena	None	0	RE - Earth	Town of Plattekill	MIKE LEMBO	Private	Irrigation		Not Found	Not Rated		Y
193-4135	NY13146	C	Mill Pond Dam		Ulster	3	A	None	N	LOWER HUDSON	KRIPPLEBUSH CREEK	High Falls	None	1974	CN - Concrete Gravity	Town of Marbletown	JANE & CLARENCE HANSEN	Private	Irrigation	12/31/1901	Not Found	Not Rated		Y
194-5905	NY17073	B	Minard & Sons Farm Pond Dam		Ulster	3	0		N				None	0	-	Not Found	W. G. Minard and Sons Inc.	Private	Not Found	5/30/2019	Not Found	Not Rated		Y
194-3635	NY13184	B	Minard Pond Dam		Ulster	3	A	None	Y	LOWER HUDSON	TR-PLATTEKILL BROOK	Clintondale	None	1967	RE - Earth	Town of Lloyd	H RUSSELL MINARD	Private	Fire Protection, Stock, Or Small Farm Pond	12/18/2012	Not Found	Not Rated		Y
176-0894	NY12908	B	Moonhaw Club Pond Dam		Ulster	3	A	None	N	LOWER HUDSON	WITTENBURG BROOK	West Shokan	None	1906	CN - Concrete Gravity	Town of Shandaken	MOONHAW CLUB	Private	Other	4/24/1973	Not Found	Not Rated		Y
177-5798	NY16936	D	MOONY POND DAM		Ulster	3	A		N	LOWER HUDSON	Rochester Creek	Mill Hook	None	0	RE - Earth	Town of Rochester	Brent and Cheadle Julia Brandenburg	Private	Recreation	4/12/2012	Not Found	Not Rated		Y
211-0763	NY13433	C	Mott Pond Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-BLACK CREEK	Esopus	None	1920	CN - Concrete Gravity	Town of Esopus	LILA MOTT	Private	Other	4/25/1973	Not Found	Not Rated		Y
210-5868	NY17029	C	Mount Marion Park Dam		Ulster	3	A		N	LOWER HUDSON	Plattekill Creek		None	0	CN - Concrete Gravity	Town of Saugerties	TOWN OF SAUGERTIES	Local Government	Fire Protection, Stock, Or Small Farm Pond, Recreation		Not Found	Not Rated		Y
193-1071	NY13142	D	Mountain Reservoir Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-RONDOUT CREEK	Rosendale	On File	1936	MS - Masonry, CN - Concrete Gravity	Town of Rosendale	TOWN OF ROSENDALE	Local Government	Water Supply - Primary	4/4/2013	8/13/2013	Not Rated		Y
210-5326	NY15012	C	Mt. Airy Road Dam		Ulster	3	A	None	N	LOWER HUDSON			None	0	RE - Earth	Town of Saugerties	PATRICIA BALIS	Private	Recreation		Not Found	Not Rated		Y
178-0665	NY12946	B	Murrays Pond Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-VERKEERDER KILL	Ulsterville	None	1926	RE - Earth	Town of Shawangunk	Dharma Drum Retreat Center	Private	Recreation	12/17/2018	Not Found	Not Rated		Y
178-1171	NY12951	A	Nevele Country Club Pond Dam		Ulster	3	0	None	N	LOWER HUDSON	SANDBURG CREEK	Ellenville	None	1940	TC - Timber Crib, RE - Earth	Town of Wawarsing	NEVELE COUNTY CLUB	Private	Recreation	4/6/1973	Not Found	Not Rated		Y
193-0724	NY13136	C	New Paltz Lower Reservoir Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-KLEINE KILL	Butterville	On File	1925	VA - Arch	Village of New Paltz	VILLAGE OF NEW PALTZ	Local Government	Water Supply - Secondary	3/9/2017	1/17/2017	Not Rated		Y
193-0727	NY13139	C	New Paltz Middle Reservoir Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-KLEINE KILL	Butterville	On File	1893	CN - Concrete Gravity, ER - Rockfill	Town of New Paltz	VILLAGE OF NEW PALTZ	Local Government	Water Supply - Secondary	3/9/2017	1/17/2017	Not Rated		Y
193-0726	NY13138	C	New Paltz Reservoir Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-KLEINE KILL	Butterville	On File	1914	CN - Concrete Gravity, ER - Rockfill	Village of New Paltz	VILLAGE OF NEW PALTZ	Local Government	Water Supply - Secondary	11/13/2018	1/18/2017	Not Rated		Y
193-0725	NY13137	C	New Paltz Upper Reservoir Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-KLEINE KILL	Butterville	On File	1893	CN - Concrete Gravity, RE - Earth	Village of New Paltz	VILLAGE OF NEW PALTZ	Local Government	Water Supply - Secondary	3/9/2017	1/17/2017	Not Rated		Y
178-3503	NY12960	B	North Woods Dam #1		Ulster	3	A	None	N	LOWER HUDSON	TR-DWAAR KILL	None	None	1965	RE - Earth	Town of Shawangunk	WATCHTOWER BIBLE AND TRACT SOCIETY OF NEW YORK, INC.	Private	Fire Protection, Stock, Or Small Farm Pond	4/23/1973	Not Found	Not Rated		Y
178-4811	NY01083	B	North Woods Dam #2		Ulster	3	A	None	N	LOWER HUDSON	TR-DWAAR KILL	Red Mill	None	1984	RE - Earth	Town of Shawangunk	WATCHTOWER BIBLE AND TRACT SOCIETY OF NEW YORK, INC.	Private	Water Supply - Secondary	11/24/2009	Not Found	Not Rated		Y
212-0616A	NY13479	C	Old Man's Kill Dam		Ulster	3	A	None	N	LOWER HUDSON	OLD MAN'S KILL	Marlboro	None	0	MS - Masonry, ER - Rockfill	Town of Marlborough	WILLIAM LYONS & NANCY DALBY	Private	Irrigation	6/22/1973	Not Found	Not Rated		Y
193-2705	NY13144	A	Old Mill Pond Dam	New Paltz College Assoc Pond Dam, Ashokan Field Campus Dam, Winchell's Falls Dam	Ulster	3	A	None	N	LOWER HUDSON	ESOPUS CREEK	Kingston	None	0	CN - Concrete Gravity, MS - Masonry	Town of Olive	NYCDEP DAMS WEST OF THE HUDSON RIVER	Local Government	Recreation	1/12/2006	Not Found	Not Rated		Y
194-3065	NY00127	A	Pecks Dam	Lake Sharon	Ulster	3	B	None	N	LOWER HUDSON	TR-MARA KILL	Benton Corners	None	1962	RE - Earth	Town of Gardiner	BRUCE CONSIGLIO	Private	Recreation	7/25/2019	4/7/2010	Unsound - More Analysis needed		Y

STATE_ID	FEDERAL_ID	QUAD	NAME_ONE	NAME_TWO	COUNTY_NAM	REGION_NAM	HAZARD_COD	P1_INSP_DE	SCS	BASIN_NAME	RIVER_STRE	NR_CITY_NA	EAP_STATUS	YEARBUILT	CONSTR_TYP	MUNI	OWNERS	OWNERTYPE	PURPOSES	LAST_INSP	LST_AN_CRT	LST_COND_R	Hudson Aquatic Barrier*	Potential Aquatic Barrier
177-4295	NY12928	A	Peekamoose Lake Dam		Ulster	3	A	None	N	LOWER HUDSON	RONDOUT CREEK	Peekamoose	None	0	CN - Concrete Gravity	Town of Denning	HOWARD M PACK	Private	Recreation	5/27/1980	Not Found	Not Rated		Y
176-1507	NY01586	A	Pine Hill Lake Dam		Ulster	3	B	None	N	LOWER HUDSON	BIRCH CREEK	Big Indian	On File	1987	RE - Earth	Town of Shandaken	NYS Olympic Regional Development Authority, Belleayre Mountain Ski Center, NYS DEC DIVISION OF LANDS & FORESTS	State	Recreation, Water Supply - Secondary	3/9/2017	2/4/2019	Not Rated		Y
178-4223	NY12965	D	Pinebush Lake Dam		Ulster	3	A	None	N	LOWER HUDSON	TOMY KILL	Ulsterville	None	0	RE - Earth	Town of Shawangunk	MARK GLUSZAK	Private	Recreation	11/13/2018	3/12/2014	Not Rated		Y
163-1385	NY12776	B	Pioneer Lake Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-BEERKILL BROOK	Greenfield Park	None	1949	RE - Earth	Town of Wawarsing	PIONEER COUNTRY CLUB	Private	Recreation	7/21/1988	Not Found	Not Rated		Y
194-5821	NY16981	D	Plattekill Rod & Gun Club Dam		Ulster	3	A		N	LOWER HUDSON	Quassaic Creek	Elder	None	0	RE - Earth	Town of Plattekill	Plattekill Rod & Gun Club	Private	Recreation	12/18/2012	Not Found	Not Rated		Y
194-3666	NY13185	D	Rizzo Farm Pond Dam		Ulster	3	A	None	Y	LOWER HUDSON	GIDNEYTOWN CREEK	Fostertown	None	1967	RE - Earth	Town of Marlborough	NICHOLAS RIZZO	Private	Fire Protection, Stock, Or Small Farm Pond	12/31/1901	Not Found	Not Rated		Y
162-4511	NY01328	B	Round Pond Dam		Ulster	3	A	None	N	DELAWARE	TR-W BR NEVERSINK RIVER	Claryville	None	1961	RE - Earth	Town of Denning	ROUND POND CLUB INC	Private	Recreation	8/25/1998	Not Found	Not Rated		Y
192-5105	NY14746	D	Saugerties Reservoir Dam		Ulster	3	0	None	N	LOWER HUDSON	PLATTEKILL CREEK	Blue Mountain	None	0	OT - Other	Town of Saugerties	VILLAGE OF SAUGERTIES	Local Government	Water Supply - Primary	8/28/2012	Not Found	Not Rated		Y
211-5758	NY16895	C	SCHOETTLE / GREENE DAM		Ulster	3	A		N	LOWER HUDSON	Trib - Swarte Kill		None	1998	RE - Earth	Town of Esopus	MATTHEW M. GREENE, MARIAN I. SCHOETTLE	Private	Recreation	10/2/1996	Not Found	Not Rated		Y
176-3396	NY12913	C	Shandaken Rod And Gun Club Dam		Ulster	3	A	None	N	MOHAWK	NEVERSINK CREEK	Frost Valley	None	1965	RE - Earth	Town of Shandaken	SHANDAKEN ROD AND GUN CLUB	Private	Recreation	5/8/1973	Not Found	Not Rated		Y
212-0639	NY13483	A	Shantz Park Lower Pond Dam	Long Lake	Ulster	3	A	None	N	LOWER HUDSON		Milton	None	1800	RE - Earth, ER - Rockfill	Town of Marlborough	TOWN OF MILTON	Local Government	Recreation	6/22/1973	Not Found	Not Rated		Y
212-0638	NY13482	A	Shantz Park Upper Pond Dam	Round Lake	Ulster	3	A	None	N	LOWER HUDSON	TR-HUDSON RIVER	Milton Ny	None	1860	MS - Masonry, ER - Rockfill	Town of Marlborough	TOWN OF MILTON	Local Government	Recreation	6/22/1973	Not Found	Not Rated		Y
193-4164	NY13147	A	Sherret Chase Dam		Ulster	3	A	None	N	LOWER HUDSON	BUTTERNUT CREEK	Shokan	None	1974	RE - Earth	Town of Olive	SHERRETT E CHASE	Private	Recreation	11/18/2016	Not Found	Not Rated		Y
194-5825	NY16980	A	Silver Pond Dam		Ulster	3	A		N	LOWER HUDSON	Trib - Mara Kill	Benton Corners	None	0	RE - Earth	Town of Gardiner	CHARLES B SILVER	Private	Recreation	8/8/2013	Not Found	Not Rated		Y
194-1242	NY13171	A	Smiley Dam		Ulster	3	A	None	N	LOWER HUDSON	PETERS KILL	None	None	1946	ER - Rockfill	Town of Rochester	GEORGE H SMILEY & SON INC	Private	Hydroelectric	12/14/2009	Not Found	Not Rated		Y
176-4221	NY12916	A	Snow Making Pond Dam		Ulster	3	A	None	N	LOWER HUDSON	CATHDRAL GLEN BROOK	Pine Hill	None	1975	RE - Earth	Town of Shandaken	NYS Olympic Regional Development Authority, Belleayre Mountain Ski Center, NYS DEC DIVISION OF LANDS & FORESTS	State	Recreation	3/9/2017	Not Found	Not Rated		Y
193-4249	NY13149	D	Society Of Brothers Pond Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-WALLKILL RIVER	Rifton	None	1977	RE - Earth	Town of Esopus	SOCIETY OF BROTHERS INC	Private	Recreation	12/31/1901	Not Found	Not Rated		Y
177-5944	NY17114	D	South Pond Dam		Ulster	3	A		N			Mill Hook	None	0	RE - Earth	Town of Rochester	SHAWANGUNK BLDG & DEVEL	Private	Not Found		Not Found	Not Rated		Y
193-0831	NY13141	B	Springlake Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-ESOPUS CREEK	Kingston	None	1901	MS - Masonry, ER - Rockfill	County of Ulster	CHARLES MERRITT	Private	Other, Recreation	4/3/1973	Not Found	Not Rated		Y
178-3252	NY12959	A	Steinberg Lake Dam		Ulster	3	D	None	N	LOWER HUDSON	TR-SANDBURG CREEK	Ellenville	None	1962	CN - Concrete Gravity, RE - Earth	Town of Wawarsing	ISRAEL STEINBERG	Private	Recreation	5/15/1997	Not Found	Not Rated		Y
193-0778	NY00075	D	Sturgeon Pool Dam		Ulster	3	C	Unsafe Stability	N	LOWER HUDSON	WALLKILL RIVER	Rosendale	On File	1922	CN - Concrete Gravity	Town of Esopus	Central Hudson Gas & Electric Corp.	Public Utility	Hydroelectric	11/13/2018	1/9/2020	No deficiencies noted		Y
194-5757	NY16894	B	SUNY NEW PALTZ DET. POND DAM		Ulster	3	A		N	LOWER HUDSON	Trib - Wallkill River	Cross Creek Road	None	2004	RE - Earth	Village of New Paltz	SUNY NEW PALTZ	State	Flood Control and Storm Water Management	2/25/2013	Not Found	Not Rated		Y
194-0676	NY13166	B	Terhune Dam		Ulster	3	0	None	N	LOWER HUDSON	BLACK CREEK	Clintondale	None	1905	ER - Rockfill, CN - Concrete Gravity	Town of Lloyd	WILLIAM G MINARD	Private	Irrigation	12/12/2012	Not Found	Not Rated		Y
194-2420	NY00083	A	Tillson Lake Dam		Ulster	3	C	Unsafe Spillway Capacity	N	LOWER HUDSON	PALMAGHATT KILL	Rutsonville	On File	1930	RE - Earth	Town of Gardiner	NYSOPRHP - PALISADES INTERSTATE PARK COMMISSION	State	Recreation	4/25/2018	1/25/2019	Unsound - Deficiency Recognized		Y
212-2996	NY13511	A	Troncillito Brothers Pond Dam		Ulster	3	A	None	Y	LOWER HUDSON	TR-HUDSON RIVER	Marlboro	None	1961	RE - Earth	Town of Marlborough	TRONCILLITO BROTHERS	Private	Fire Protection, Stock, Or Small Farm Pond	4/26/1973	Not Found	Not Rated		Y
177-3810	NY01107	C	Ulster Heights Lake Dam		Ulster	3	A	None	N	LOWER HUDSON	BOTSFORD BROOK	Ulster Heights	None	1969	RE - Earth	Town of Wawarsing	ULSTER HEIGHTS LAKE INC	Private	Recreation	4/26/2011	Not Found	Not Rated		Y
177-3067	NY12921	D	Vagenas Pond Dam		Ulster	3	A	None	N	LOWER HUDSON	VLY BROOK	Accord	None	1962	CN - Concrete Gravity	Town of Rochester	NICKOLAS & NANCY VAGENAS	Private	Recreation	5/11/1973	Not Found	Not Rated		Y
162-5047	NY14322	D	Vaitzicz Dam		Ulster	3	D	None	N	LOWER HUDSON			None	1983	RE - Earth	Town of Wawarsing	MITCH VAITZICZ	Private	Other	2/10/1984	Not Found	Not Rated		Y
192-1636	NY13127	C	Van De Bogart Marsh Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-LITTLE BEAVER KILL	None	None	1952	RE - Earth	Town of Woodstock	AARON VAN DE BOGART JR	Private	Other	4/24/1973	Not Found	Not Rated		Y
177-4961	NY12929	D	Vincent Dunn Pond Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-RONDOUT CREEK	Kerhonkson	None	0	RE - Earth	Town of Rochester	Valerie Friedlander	Private	Recreation	4/25/2018	Not Found	Not Rated		Y
177-5083	NY14723	D	Vrasidas Dam		Ulster	3	B	None	N	LOWER HUDSON	MOMBACCUS CREEK	Cherrytown	None	1947	CN - Concrete Gravity, RE - Earth	Town of Rochester	MPV LAZY ACRES INC.	Private	Recreation	6/26/2019	Not Found	Unsound - More Analysis needed		Y
177-4062	NY12926	A	Vurckio Pond Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-RONDOUT BROOK	Lowes Corners	None	1973	RE - Earth	Town of Denning	FRANK VURCKIO	Private	Recreation	12/31/1901	Not Found	Not Rated		Y
194-3008	NY13176	B	Walker Farm Pond Dam #1		Ulster	3	A	None	Y	LOWER HUDSON	TR-BLACK CREEK	Clintondale	None	1961	RE - Earth	Town of Plattekill	W H WALKER & SON	Private	Fire Protection, Stock, Or Small Farm Pond	12/12/2012	Not Found	Not Rated		Y
194-3390	NY13181	B	Walker Farm Pond Dam #2		Ulster	3	A	None	Y	LOWER HUDSON	TR-BLACKCREEK	Clintondale	None	1965	RE - Earth	Town of Plattekill	WILLIAM H WALKER JR	Private	Fire Protection, Stock, Or Small Farm Pond	1/11/2011	Not Found	Not Rated		Y
194-0620	NY13164	C	Wallkill Mfg Co Dam		Ulster	3	A	None	N	LOWER HUDSON	WALLKILL RIVER	Wallkill	None	1912	CN - Concrete Gravity	Town of Shawangunk	WINDSOR MACHINERY CORPORATION	Private	Hydroelectric	4/27/2012	Not Found	Not Rated		Y
194-5207	NY14846	C	Wallkill Rod & Gun Club Pond Dam		Ulster	3	A	None	Y	LOWER HUDSON		Wallkill	None	0	RE - Earth	Town of Shawangunk	WALLKILL ROD & GUN CLUB	Private	Recreation	4/27/2012	Not Found	Not Rated		Y

STATE_ID	FEDERAL_ID	QUAD	NAME_ONE	NAME_TWO	COUNTY_NAM	REGION_NAM	HAZARD_COD	P1_INSP_DE	SCS	BASIN_NAME	RIVER_STRE	NR_CITY_NA	EAP_STATUS	YEARBUILT	CONSTR_TYP	MUNI	OWNERS	OWNERTYPE	PURPOSES	LAST_INSP	LST_AN_CRT	LST_COND_R	Hudson Aquatic Barrier*	Potential Aquatic Barrier
146-5950	NY17120	D	Walsh Dam		Delaware	4	A		N	DELAWARE	Trib - Delaware River		None	0	RE - Earth, ST - Laid Up Stone	Town of Andes	Terrence & Kaythleen Walsh	Private	Recreation		Not Found	Not Rated		Y
194-5407	NY16032	A	Watchtower Farms Lower Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-PALMAGHATT KILL	Rutsonville	None	0	OT - Other	Town of Gardiner	WATCHTOWER BIBLE AND TRACT SOCIETY OF NEW YORK, INC.	Private	Water Supply - Primary	6/14/2000	Not Found	Not Rated		Y
194-5406	NY16033	A	Watchtower Farms Upper Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-PALMAGHATT KILL	Rutsonville	None	0	RE - Earth	Town of Gardiner	WATCHTOWER BIBLE AND TRACT SOCIETY OF NEW YORK, INC.	Private	Other, Water Supply - Primary	6/14/2000	Not Found	Not Rated		Y
162-2638	NY00519	B	Wawayanda Camp Dam	Wawayanda Lake	Ulster	3	A	None	N	DELAWARE	TR-W BR NEVERSINK RIVER	Claryville	None	1958	RE - Earth	Town of Denning	FROST VALLEY YMCA	Private	Recreation	3/26/2009	Not Found	Not Rated		Y
212-3514	NY13513	A	Werba Fish Pond Dam		Ulster	3	A	None	Y	LOWER HUDSON	TR-HUDSON RIVER	Marlboro	None	1966	RE - Earth	Town of Marlborough	WILLIAM WERBA	Private	Fire Protection, Stock, Or Small Farm Pond, Recreation	4/26/1973	Not Found	Not Rated		Y
192-4740	NY13133	C	Wilson Park Lake Dam		Ulster	3	A	None	N	LOWER HUDSON	LITTLE BEAVERKILL	Mount Tremper	None	1979	RE - Earth	Town of Woodstock	NYS DEC	State	Recreation	3/31/2011	Not Found	Not Rated		Y
178-0737	NY12949	A	Windsor Lake Dam	Camp Emunah Dam	Ulster	3	A	None	N	LOWER HUDSON	BEAR KILL	Greenfield Park	None	1924	ST - Laid Up Stone, MS - Masonry	Town of Wawarsing	CAMP E-MU-NAH INC.	Private	Recreation	10/21/2010	Not Found	Not Rated		Y
176-0916	NY00952	C	Winnisook Lake Dam		Ulster	3	A	None	N	LOWER HUDSON	ESOPUS CREEK	Oliverea	On File	0	RE - Earth	Town of Shandaken	WINNISOOK INC	Private	Recreation	10/10/2013	2/22/2012	Not Rated		Y
194-5895	NY17062	C	Witkin Pond Dam		Ulster	3	A		N	LOWER HUDSON	Trib - Wallkill River		None	0	RE - Earth	Town of Shawangunk	Merrie Faye Witkin	Private	Recreation		Not Found	Not Rated		Y
192-5018	NY14166	D	Woodstock Golf Club Dam		Ulster	3	A	None	N	LOWER HUDSON	SAW KILL	Zena	None	0	CN - Concrete Gravity	Town of Woodstock	WOODSTOCK GOLF CLUB	Private	Other	2/7/2012	Not Found	Not Rated		Y
192-0906	NY14633	C	Yankeetown Pond Dam	Yankeetown Pond	Ulster	3	A	None	N	LOWER HUDSON	LITTLE BEAVER KILL		None	0	RE - Earth	Town of Woodstock	Not Found	Not Found	Other	4/10/2017	Not Found	Not Rated		Y
161-3927	NY00523	D	Ylyvaal Lake Dam		Ulster	3	A	None	N	DELAWARE	TR-DRY BROOK	Arkville	None	1973	RE - Earth	Town of Hardenburgh	SILVIA GOULD	Private	Recreation	12/31/1901	Not Found	Not Rated		Y
178-0732	NY12948	A	Young & Humphrey Pond Dam		Ulster	3	A	None	N	LOWER HUDSON	RONDOUT CREEK	Nanapoch	None	1900	MS - Masonry	Town of Wawarsing	YOUNG & HUMPHREY	Private	Irrigation	4/4/1973	Not Found	Not Rated		Y
163-3247	NY12781	B	Zalkin Pond Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-BEERKILL CREEK	Dairyland	None	1964	RE - Earth	Town of Wawarsing	ROBERT ZALKIN	Private	Recreation	4/6/1973	Not Found	Not Rated		Y